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User Instructions Δ Δ  
Computer Program For  
Benefit/Cost Analysis  
For Plant Protection Programs Δ Δ

to R. J. Daum. ③

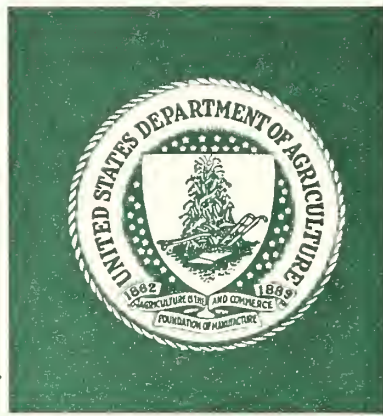
✓ U.S. Department of Agriculture  
✓✓ Animal and Plant Health Inspection Service  
✓✓ Plant Protection and Quarantine Programs //

January 1976

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User Instructions--Benefit/Cost Analysis  
For Plant Protection Programs

There are no simple solutions,  
only intelligent choices.

Inputs and outputs--an overview: This computer program calculates benefits as the difference between two cash flows and cost as expenditures required to achieve a change in the cash flow. All inputs for from two to eight options (mutually exclusive courses of action) may be entered. The computer program then generates the cash flows associated with each option, a pair at a time, for all possible pairs of options.

The inputs for each option consist of the following:

1. Title card--80 letters, including blanks.
2. Parameter card--Number of option in the analysis, the interest rate to be used in discounting, the number of crop-area subdivisions, and P2 (see Input Format, page 19, cc 10-20).
3. Option title card--80 letters, with first 7 being used as an abbreviated title and the 8th as a single symbol identification of the option.
4. Text cards--A minimum of one and a maximum of 40 cards, 80 letters per card, which permits a brief description of the option and basic assumptions.
5. Funding card--Contains Present Program Funding and Anticipated Contingency Money (maximum of 8 years).

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6. Data cards--A maximum of 50 and a minimum of 1 for each crop-area subdivision. The following information is entered on each card which is the major input for an option for a crop-area subdivision.
- a. Crop-area subdivision title (maximum of 20 letters).
  - b. T1--Years of arrival of pest in this crop-area.
  - c. T2--Year till ultimate spread of pest in this crop-area.
  - d. PL--Asymptotic value of potential loss to pest in this sub-area.
  - e. PC--Average annual potential cost (\$/unit) required to execute this option in this crop-area.
  - f. Unit--units (acres) which will receive inputs (PC) in this sub-area.
  - g. K--Average number of years each acre will receive inputs in executing this option or the number of years required to achieve program objective in this crop-area.

Items 3 through 6 are repeated for each option being considered in the analysis. Additional analyses may be placed after the first.

Following the reading of the inputs, the computer makes all possible comparisons, a pair at a time, among all the options being considered in the analysis. Comparisons are made in accordance with the order the options were entered into the computer through the use of an algorithm using the symbols F (= first) and S (= second). Option F is always used as the baseline in calculating the benefits and costs of the two options being compared.



Benefits are calculated by subtracting annual losses of Option S from losses of Option F. Cost, however, are calculated as cost of Option S minus cost of Option F because it is the additional cost of achieving the benefits of Option S that is desired. Thus, Option F is always used as the baseline or reference for estimating the additional benefits or additional costs of the two options being compared. The need or utility of including a "Zero Base" or "Do Nothing" option is, thus, apparent.

A "Zero Base" or a "Do Nothing" option will, therefore, furnish estimates of the total benefits and total costs for the options being considered in the analysis. Comparisons among the non-zero base options furnished the additional or marginal benefits and costs of the options being compared.

The basic information presented in the computer output is:

1. The flow of losses - annual values summed over all "crop-area" subunits for each of the two options being compared.
2. The flow of benefits - annual differences in losses.
3. The discounted flow of benefits.
4. The cumulative discounted flow of benefits.
5. The flow of costs - annual values summed over all "crop-area" subunits for such of the two options being compared.
6. The flow of difference in cost of the two options being compared.
7. The discounted flow of the difference in cost.
8. The cumulative discounted flow of difference in cost.

benefits are calculated by multiplying the amount of the benefit by the number of years of service. The amount of the benefit is determined by the amount of the contribution made by the employee and the amount of the contribution made by the employer. The number of years of service is determined by the number of years the employee has been employed by the employer.

The amount of the contribution made by the employee is determined by the amount of the employee's salary and the amount of the employee's contribution. The amount of the contribution made by the employer is determined by the amount of the employer's salary and the amount of the employer's contribution.

The amount of the employee's salary is determined by the amount of the employee's base salary and the amount of the employee's bonus. The amount of the employer's salary is determined by the amount of the employer's base salary and the amount of the employer's bonus.

The amount of the employee's base salary is determined by the amount of the employee's grade and the amount of the employee's step. The amount of the employer's base salary is determined by the amount of the employer's grade and the amount of the employer's step.

The amount of the employee's bonus is determined by the amount of the employee's performance and the amount of the employee's bonus. The amount of the employer's bonus is determined by the amount of the employer's performance and the amount of the employer's bonus.

The amount of the employee's performance is determined by the amount of the employee's rating and the amount of the employee's bonus. The amount of the employer's performance is determined by the amount of the employer's rating and the amount of the employer's bonus.

The amount of the employee's rating is determined by the amount of the employee's score and the amount of the employee's bonus. The amount of the employer's rating is determined by the amount of the employer's score and the amount of the employer's bonus.



All the monetary relationships between benefits and costs are calculated from these basic cash flows. The comparison between each pair of options is summarized in a sentence form. The entire analysis (all comparisons among all options) is summarized in four tables: (1) the text of the options considered, (2) a table of the input data, (3) a table of funding data, and (4) a grand summary table, which contains many of the pertinent statistics generated in comparing the options being considered.

The computer program, as it reads and stores the input data, calculates the coefficients (slope and intercept) of a logistic growth curve and determines the time horizon of the problem as  $(\text{Max } (T1 \text{ or } T2) + 5)$  for each pair of options being compared. Benefits and costs are first computed and summed for this time horizon. Summation is continued until the present value of the benefits or costs for that year is less than \$0.0005 million, for a maximum of 200 years.

Annual losses and costs: Signoid growth curves are calculated using the following formulae:

$$(1) \text{ Losses} = PL / (1 + \exp - (a + b t))$$

$$(2) \text{ Costs} = P C X \text{ acres} / (1 + \exp - (a + b (t - k)))$$

Where  $a$  = intercept of logistic growth curve (value of logit when year is zero)

$b$  = rate of growth of logistic curve

Annual benefits = Losses Option F - Losses Option S 1/

Annual Costs = Cost S - Cost Option F

Discounted values for the year  $t = \$ / (1 + i)^t$ , where  $i$  = interest rate as a decimal.

1/(F= first, S= second, re order entering option into computer)



The present values of the cash flows are the sums of the discounted cash flows.

The logistic growth curve permits simulating the flow of losses associated with the spread of a plant pest. The logistic curve has as its basis, birth, and death rates, which can be linked to population growth or the spread of a pest. As used in the computer program, the logistic curve permits simulating cash flows that gradually phase in or out.

Comparison Among Options: The possible combination of comparisons that can be made by the present program (January 1976) are as follows:

<u>Options</u>		<u>Options</u>					
1	2	3	4	5	6	7	8
1	1 vs 2*	1 vs 3	1 vs 4	1 vs 5	1 vs 6	1 vs 7	1 vs 8
2		2 vs 3	2 vs 4	2 vs 5	2 vs 6	2 vs 7	2 vs 8
3			3 vs 4	3 vs 5	3 vs 6	3 vs 7	3 vs 8
4				4 vs 5	4 vs 6	4 vs 7	4 vs 8
5					5 vs 6	5 vs 7	5 vs 8
6						6 vs 7	6 vs 8
7							7 vs 8

\*NOTE: 1 versus 2 is the opposite of 2 versus 1, therefore, only the sign of the benefits and costs will change. Changing the order in which the options are entered into the computer permits different comparison (e.g., entering the four options in the following order 1, 3, 4, 2 will produce the following comparisons 1 vs 3, 1 vs 4, 1 vs 2, 3 vs 4, 3 vs 2, and 4 vs 2.



## Forecasting and Simulation

Forecasting is an uncertain but necessary art in completing a benefit/cost analysis. Therefore, benefit/cost analyses are often held in low esteem and are prone to criticism. This weakness can be largely overcome by completing two benefit/cost analyses. One analysis reflecting the more optimistic views, the other the more pessimistic views. Those persons who tend to be pessimistic about the pest (i.e., that it will inflict more losses and that it will spread faster than will occur in the real world) will tend to be optimistic about the capability of dealing effectively with the pest (i.e., that spread can be delayed longer, or that eradication can be achieved in less time and at less cost that will occur). However, it is possible that a person could be pessimistic or optimistic about both the pest and program capability, so that four "camps" can be envisioned. In such cases it may be desirable to complete four analyses to encompass the four possible positions. Pessimism and optimism should be recognized as a continuum and that there will always be extremes on both ends. The proponents of extreme positions will most likely modify their positions in a structured review process, such as through a critique of an analysis containing the pessimistic and optimistic views.

Most benefit/cost analyses will require several revisions before becoming acceptable to the majority of the individuals or parties associated with the problem being simulated. Those responsible for executing the options and those directly affected by the pest or the execution of the options will frequently have different objectives or perceive the situation differently. Likewise, different levels of management may often have different objectives or different perspectives.



In addition to the uncertainties in forecasting and the efforts required to reach a concurrence of views, the world we interact with is constantly changing. What may have been the most rational or logical solution a short time ago, may be outdated, outmoded, or simply inappropriate today. Consequently, frequent revision or reanalysis of the benefits and costs can be anticipated. This computer program greatly facilitates frequent in-depth revisions as well as the exploration of alternative courses of action. Computer costs for a very large benefit/cost analysis should not exceed \$20. Computer costs, for more routine analyses (such as the attached) will be in the range of \$2 to \$10.

Benefit/cost information shall always remain but one input in the allocation of scarce resources. Ideally, the quality of inputs for a benefit/cost analyses should be commensurated with the quality of the other inputs in the decision being made. The higher the quality of inputs to a benefit/cost analysis (a mathematical model), the closer the analysis will simulate the real world situation. What may have been marginally acceptable quality for one decision may be of disproportionately high quality for another decision. This computer program permits simulating real world situations to the degree of reality desired. In addition, the tying of program costs to program benefits, while forcing some restriction on the user, has the merit of requiring a degree of truthfulness--that benefits cannot be claimed for unrelated expenditures.

The major merit of this computer program will remain its ability to perform a series of repetitive calculations very rapidly and precisely, and to present the inputs and outputs in a well organized, well labeled format that







facilitates comprehension. The original purpose for constructing this computer program was to estimate the benefits resulting from delaying the spread of a plant pest, which in practice, is the difference between two cash flows. When the concepts inherent in achieving this purpose were reduced to practice it was realized that the equations developed were applicable to other pest problems where the major interest lies in the temporal aspects of cash flows.

This program was developed under the assumption that the asymptotic values for losses (PL = Potential Losses) would be calculated prior to undertaking a benefit/cost analysis. Most published benefit/cost studies stop at estimating the asymptotic values for losses. The time at which these asymptotic values are reached is of paramount importance. Although a discussion of methods used to estimate such asymptotic values is pertinent to benefit/cost analysis, such a discussion would be inappropriate in this text. For simulating the spread of a plant pest, the sigmoid growth curve appears quite adequate. In the final analysis, the type of growth curve has little influence on the results obtained, for benefits and costs are the differences between pairs of curves.

This computer program, assuming that the situation is modeled accurately, permits meaningful comparisons among options having different losses accruing at different future times. In a broad sense, this computer program is simply a tool that permits handling the temporal aspects of cash flows in a rational manner and may have application beyond pest problems per se.

#### Other Growth Functions:

- Those persons desiring to use some function other than the sigmoid growth curve (the logistic) or to employ a more complex relationship between



potential losses and the flow of losses, may easily modify the present program either by employing a subroutine or by changing a few computer program statements. For example, the hypergeometric or double binominal could easily be substituted for the logistic function provided such a function could be specified from the T1's and T2's and could be stepped 1 year at a time. Those functions not capable of being specified by T1's and T2's will require greater programming effort to capture the temporal aspects of the cash flows.

### Simulation Techniques

#### Losses and Benefits:

There are a number of ways that real world situations can be simulated with this computer program. The most obvious is through the use of T1's and T2's and potential losses (PL). For example, T1 = -5, and T2 = + 5 will produce a cash flow having a value of PL/2 at year 0 (today) which will rise to PL at year 5, while T1 = + 5, T2 = - 5 will produce a cash flow having a value of PL/2 at year 0 and which will decrease to zero at year 5. If eradication was to begin at year 4 and be achieved 3 years later, the annual losses to this pest could be simulated by entering T1 = 4 + 3 = 7 and T2 = 4. Losses would remain at PL for years 1 through 4 and would then gradually decrease to zero between years 4 and 7. The benefits of a proposed option that would reduce losses from an existing pest by 10 percent, but would require 10 years to fully implement throughout the host crop producing area, versus the option of continuing the existing pest control strategy, could be simulated by the following:

	T1	T2	PL
Option 1	2	12	$PL - (PL \times .1) = PL \times 0.9$
Option 2	-10	-5	PL



These inputs would produce two cash flows for losses--one for each option. The inputs for Option 1 would generate a cash flow rising from 0 beginning at year 2 and then remain equal to  $PL \times 1.c.0.9$  starting at year 12. The inputs for Option 2 would generate a cash flow remaining constant at PL (Note: T1 and T2 could be any negative values as long as T1 is greater than T2). Benefits would be the sum of the difference in the cash flows for these two options, which would simulate the gradual shift from one pest control strategy to another--or the replacement of one cash flow with another.

The bringing into production of a parcel of land beginning at year 20, followed by continued harvest from this land for the next 25 years and then the phasing out of production of this same parcel of land over the next 10 years, could be simulated by the following:

	<u>T1</u>	<u>T2</u>	<u>PL</u>
Crop-Area A			
Option 1	20	25	PL*
Option 2	20	25	0
Crop-Area B			
Option 1	50	60	-PL
Option 2	50	60	0

\*Where PL now becomes the average annual value of production from the parcel of land.

In this example, PL for Option 1, Crop-Area B was made negative to cancel the first PL at the specified time. Setting  $PL = 0$  in Option 2 created a "dummy" entry which was required to satisfy the "loops" within the computer system. When dummy entries are utilized, any value for T1 and T2 can be entered. There is no way this case flow can be simulated by this computer program without using dummy entries.





With these examples as a guide, more complex simulations can be easily developed, such as eradication of a pest starting on three sides at different dates and proceeding at different rates. To make certain the simulation is as desired, a trial run using only a few key parts (say, one or two areas) and constants for potential losses, such as 1 (one), may be desirable. As an aid in visualizing the cash flow to be simulated, they can be sketched as on a chalkboard or piece of paper and T1's and T2's at the major inflection points marked and labeled.

Only one option should be modeled at a time, beginning with the basic assumptions and proceeding to the T1's, T2's, PL's, K's, PC's, and Acres, for each crop-area subdivision. As an aid in clarification, it is helpful to model the "Do Nothing" option before modeling other options. After all options have been modeled, the inputs should be checked for internal consistency (e.g., the "Do Nothing" option will normally have the fastest rate of spread).

#### Variable Costs:

The manner in which annual variable costs are generated by this computer program may be regarded in two ways. The first is of cost resulting from operations being conducted on the periphery, such that new acreage is brought into the program as old acreage is phased out. This concept permits spread to be regarded as either positive or negative (eradication) and operations to achieve the program objective as occurring in annuli around a foci (point).

The second manner of regarding annual variable costs is that of a distribution. With this concept, costs are normally distributed (bell shaped curve) over





each crop-area subdivision, such that initial work may require little input, but as the infestation spreads the annual cost rises beginning at T1-K, and ultimately then falls to zero at T2. The distribution concept of costs may be most appropriate when little detailed information is available about the functions to be executed.

The simulation of cash flows for costs relies primarily on the simulation resulting from T1 and T2 (i.e., costs precede and are directly tied to benefits). However, additional simulation can be achieved through use of K, PC, and Acres. For example, if eradication is to be accomplished in 3 years, then  $K = 3$ . If precise knowledge exists about unit cost and the time at which different program functions are to be executed, then it may be desirable to model each cost function and allow the computer to "integrate" the cost of the functions to obtain an estimate of the annual variable cost. Such modeling may be particularly valuable or desirable if different K's are known to exist for the different functions to be executed within each Crop-Area subdivision. Such modeling of cost will most likely require dummy entries for benefits which requires that PL be set to zero (0) for each dummy entry.

The present computer program will accept only whole numbers (those without decimals) for T1, T2, and K. In view of the uncertainty or "soft" inputs and the imprecision of forecasting, the use of less than whole years, especially for K, would represent unwarranted precision.

Making K negative will cause program costs to follow, rather than precede, changes in annual losses. Zeroes may be entered for K, \$/acre, or Acres



which will produce zero variable costs for the Crop-Area subdivision. Thus, if an option has no cost, such as "Do Nothing," setting K to zero is the recommended procedure for obtaining zero variable costs for that option. Although the same result can be achieved by setting \$/acre and Acres to zero, division by zero will result, if all Acres were set to zero causing the computer to abort. Total variable cost is more sensitive to PC (\$/acre) than to any of the other inputs.

#### Fixed Costs:

Often there are costs which are difficult or impossible to relate to units of host crop, or to achieving the program objective. For example, emergencies may arise where money is needed to prevent loss of gains achieved through previous inputs. It is probably not possible to define what an emergency is or how long an emergency may exist before it should be regarded as a real long-term problem. For the purpose of this computer program, 8 years was taken as the maximum life of an emergency, which should be sufficient time to permit certain fixed costs such as "contingency money" and "present funding" to be remodeled as variable costs associated with their benefits.

An option having a continuous input (fixed cost) but no spread, can be simulated by entering annual program cost under Present Funding and then setting  $T1 = 10$ ,  $T2 = 195$ ,  $PL = 0$ , and  $K = 0$ . The computer will cycle 200 times (years), setting Present Funding to zero of the 195th year. For those wishing to use a time horizon longer than 200 years, only a few minor changes in the appropriate program statements would be required. However, the present value of the costs for the 174th year must be equal to \$15,934 million to have a present value of \$0.001 million at a 10 percent interest rate.



A careful compiling of inputs will often permit replacing fixed costs represented by Present Program Funding and Anticipated Contingency Money, with variable costs. However, accurate simulation of such costs requires precise estimates of \$/acre, K, Acres, as well as T1 and T2 and may require many trials to obtain variable costs that match, within rounding error, what may be regarded or "fixed costs." That it is possible to simulate fixed costs represented by Present Program Funding and Contingency Money by variable costs through use of T1's, T2's, K's, and PC's must be accepted on the basis that it has been done repeatedly. However, this has been accomplished largely by trial and error. The degree of accuracy in modeling such situations must be weighed carefully--the utility versus the time and cost of achieving the desired degree of accuracy.

The present computer program sets Present Program Funding to zero at year  $(\text{Max}(T1 \text{ or } T2) - K)$ . This technique was adopted because it produced the "smoothest" termination or phasing out of annual program cost. The handling of Present Program Funding as a fixed cost continuing through the time horizon of the situation being modeled, was selected as a practical solution to the difficult problem of modeling cost through use of T1's, T2's, K's, PC's, and acres.

The ability of the computer program to simulate the flow of benefits and costs can only be fully appreciated, or demonstrated, through individual usage. Given sufficient data of acceptable quality, it is possible to accurately "model" most historic situations. Thus, "proof" that this computer program can simulate different cash flows lies in its future use rather than in demonstrating its ability to simulate historical situations.





### Interpreting Benefits and Costs

Because benefits and costs are differences in cash flows, it is possible to obtain negative benefits or costs. A negative cost indicates that the preferred option has less cost than the option it is being compared with. A negative benefit indicates that the preferred option has less benefit than the option it is being compared with. In both situations, a negative benefit/cost ratio would result. However, a negative benefit divided by a negative cost will produce a positive benefit/cost ratio. The correct interpretation of the B/C ratio requires that the signs of the benefits and costs be considered as well as the sign of the ratio. In summary, the interpretation of a benefit/cost analysis often requires consultation between an economist and the manager(s) of the program being analyzed.

### Discounting and its Utility

In situations, such as eradication, benefits may accrue long after program costs have ceased and it is, therefore, not possible to obtain the sum of the benefits. In such situations, the benefits or costs could be summed for a specified time horizon. Discounting is a valuable tool in such situation, because it nearly eliminates the need to consider the time and rate of accrual of cash flows. However, in some situations, the time and rate of accrual of benefits and costs are of importance, and these are presented in the output along with the undiscounted benefits and costs summed over the time horizon of the problem.

Discounting cash flows can also make interpretation of a benefit/cost analysis difficult. For example, two cash flows may have the same total undiscounted





value, but different present values owing to the time and rate of accrual. Likewise, two cash flows may have nearly equal present values but have significantly different total undiscounted values.

Because it is not possible to determine a priori what a manager wishes to maximize (the greatest gain on the investment, the greatest net gain, the largest B/C ratio from present values, the largest B/C ratio from undiscounted values, etc.), all the basic monetary values are calculated and presented in the output. Additional relationships of specific interest (e.g., annual B/C ratios) can be calculated from these basic monetary values. Interpretation, however, should be made with the assistance of an economist.

#### Input Format

##### 1. Title of benefit/cost analysis

cc\* 1-80 Maximum of 80 characters including blank spaces.

This title is presented at the top of each page.

\*cc = card column

##### 2. Parameter Card

cc 1-2 Number of subdivisions (crop-areas). This must be constant for all options, maximum of 50 permitted.

cc 3-7 Interest rate as a percentage. The interest rate can be entered with a decimal point anywhere in this 5-digit field. If no decimal point is entered the computer automatically enters a decimal point between card columns 7 and 8. If the interest rate is negative, it defaults to 10 percent. However, a zero interest rate may be used by either leaving the space blank or by entering 0.0.



- cc 8 Number of options to be considered in the analysis.  
(The number of options is not the number of comparisons.)
- cc 10-20 P2. The percent of acres infested at T1 ( $= 100 - P2$  at T2). If left blank, P2 defaults to 99.99. If P2 = 50 percent, no benefits or cost will result. The utility of changing P2 is being investigated.

#### Option Title Card--80 Columns

This entire card may be left blank.

- cc 1-8 Subtitle of option. Normally the subtitle should be in the form of "OPTION X" where X is the option number or symbol and appears in cc 8.

- cc 1-80 Full title of option. This full title of the option will be printed at top of each printout of the text.

4. Text Cards--Maximum of 40 lines (cards) of 80 characters (including blanks) is permitted. If less than 40 lines are needed, the last card must have the first 8 card columns blank, which will cause the program to read the next card as a subtitle. If a printout of the assumption or a brief description of the option is not desired, simply insert one blank card for the text.

#### 5. Program Funding and Contingency Money Card

A decimal point may be entered any place in this field which will override the normal decimal point located between each of the nine 8-digit fields.



cc	1-8	Present funding-- <u>in dollars</u>	
	9-17	Contingency money 1st year--in dollars	
	18-26	" "	2nd year
	27-35	" "	3rd year
	36-44	" "	4th year
	45-53	" "	5th year
	56-62	" "	6th year
	63-71	" "	7th year
	72-80	" "	8th year

If any of these values are zero, the appropriate space may be left blank.

However, it is often helpful if 0.0 is punched in appropriate card columns.

Frequently, the computer will print -0. for Present Program Funding or anticipated contingency money when 0.0 was entered. This results from an idiosyncrasy of the computer and is unpredictable.

## 6. Input Data

cc	1-20	Crop-area subtitle
	22-24	T1 may be positive or negative, but must be a whole number.
	26-28	T2 may be positive or negative, but must be a whole number.

NOTE: If it is desired to make the cash flow decrease, make T2 the future year at which  $PL = PL$  and T1 the year  $PL = 0.0$ .

cc	31-40	PL (potential losses) must be in millions of dollars. Decimals may be used which permits entering less than whole numbers. Although the computer carries out all
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calculations in 16-place floating point arithmetic, the print out is limited to three decimals. Thus, more than three digits may be placed after the decimal, but only three decimal places will be printed.

- cc 41-50 PC (potential cost) must be entered as dollars per acre and represents the average annual cost/acre of executing the option. PC is part of the inputs for estimating variable cost and is used in conjunction with acres and K to calculate annual variable cost of the option.
- cc 51-60 Acres of host crops upon which activities to achieve the objective of the option will be executed. If only a portion of the host crop-acres will be treated, either the acres or the cost/acre should be adjusted accordingly.
- cc 64-66 K, the number of years that program activities for the option will be carried out before a given acre will be phased out of the treatment area of the crop-area subdivision. As many as 50 data cards, one for each crop-area subdivision, may be utilized for each option. The same number of crop-area subdivision and the same order should be followed for each option. However, because the computer program sums over all crop-area subdivisions each year, the pairing of subdivisions is primarily for aesthetics. Dummy entries, in which PL is set to zero, may be utilized to obtain the necessary balance to satisfy the requirement of the computer program.





## Synopsis of Inputs for Benefit/Cost Analysis

1. Title card. Title of analysis--80 card columns.
2. Parameter card. Number of crop-area subdivisions, interest rate, and the number of options in this analysis and P2 (see text) (cc 1-2, 3-7, 8, 10-20). A zero interest rate is permissible. P2 defaults to 99.99 if left blank.
3. Option Title card. Title of the option--80 card columns--cc 1-8 title of crop-area, cc 8 option number or letter, and cc 1-80 in title in its entirety.
4. Text Cards. From 1 to 40 cards, 80 card columns each, last card must be blank if less than 40 cards are used. A row of dashes, asterisks, or slashes may be used to set off the text for each option (do not enter special symbols in cc 1). The text cards may contain basic assumptions or a brief description of the option.
5. Funding Card. Program funding and contingency money--nine sets of 8 columns each, all values may be zero.
6. Data Cards. Input data--maximum of 50 cards, minimum of 1.

cc	1-20	Crop-Area subdivision title
cc	22-24	T1
cc	26-28	T2
cc	31-40	PL
cc	41-50	PC
cc	51-60	Acres
cc	64-66	K

Repeat 3 through 6 for each option. A minimum of 2 and a maximum of 8 options is permitted. Additional analyses may follow the first. All cards may be blank except the parameter card and the data cards.







PESSIM 1 DO NOTHING - ERADICATION OF 1975 CALIF. INFESTATION SUCCESSFUL.

PESSIMISTIC

OPTION 1 ASSUMES THAT NEITHER GOVERNMENTS OF GUATEMALA, MEXICO, NOR THE UNITED STATES WILL CONDUCT A PROGRAM TO RETARD THE SPREAD OF THE MEDITERRANEAN FRUIT FLY FROM CENTRAL AMERICA TO THE SUSCEPTIBLE AREAS IN NORTH AMERICA AND MEXICO. A FURTHER ASSUMPTION IS THAT THE PRODUCERS OF THE HOST CROPS WILL EMPLOY EXISTING PEST CONTROL TECHNOLOGY SIMILAR TO THAT IN USE IN THE MEDITERRANEAN COUNTRIES, TO COMBAT THIS PEST. UNREALIZED YIELDS WILL, THEREFORE, BE HELD TO A LEVEL COMMENSURATE WITH THE PRODUCER'S PERCEIVED BENEFITS FROM SUCH CONTROL MEASURES. THE POTENTIAL LOSSES GIVEN BELOW INCLUDE THE VALUE OF UNREALIZED YIELDS PLUS THE COST OF CONTROL INCURRED BY THE FARMER IN PROTECTING HIS CROPS. THE VALUES USED AS INPUTS TO THIS BENEFIT/COST ANALYSIS ARE CRUDE ESTIMATES AND REPRESENT EXPEDIENT ESTIMATES TO PERMIT MAKING A FIRST APPROXIMATION OF THE BENEFITS AND COSTS OF CONDUCTING A MEDITERRANEAN FRUIT FLY PROGRAM IN EITHER MEXICO OR GUATEMALA. THE 'DO NOTHING' OPTION IS INCLUDED TO FORM A BASIS FOR ESTIMATING THE BENEFITS AND COSTS OF THE OTHER OPTIONS. IT WAS ASSUMED THAT EACH ACRE OF HOST CROP WOULD RECEIVE 4 INSECTICIDE APPLICATIONS AT \$3.50/ACRE/ APPLICATION EXCEPT FOR MEXICO AND GUATEMALA WHERE ONLY 2 APPLICATIONS WERE ASSUMED. OWING TO THE LOWER TECHNOLOGICAL AGRICULTURE BASE. IT WAS FURTHER ASSUMED THAT THE INFESTATION IN CALIFORNIA WOULD BE ERADICATED AT A COST OF \$935000 OVER THE NEXT THREE YEARS.

PESSIM 3 MEXICO BARRIER ZONE IN TEHAUANTEPEC MARCH 1976

PESSIMISTIC

OPTION 3 ASSUMES THAT A BARRIER ZONE WILL BE ERECTED AT THE ISTHMUS OF TEHUANTEPEC, MEXICO, TO PREVENT OR GREATLY RETARD THE NORTHWARD SPREAD OF THE MEDITERRANEAN FRUIT FLY. THE BARRIER ZONE WOULD MEASURE 60-MILES-DEEP AND 80-MILES-ACROSS. THE MEDITERRANEAN FRUIT FLY POPULATION IN THE BARRIER ZONE WOULD BE MAINTAINED AT NEAR ZERO LEVEL THROUGH THE USE OF TRAPS, ULV MALATHION, TOXIC BAITS, CULTURAL PRACTICES AND QUARANTINE MEASURES. SUCH A BARRIER ZONE, IT WAS ASSUMED, WOULD PREVENT SPREAD FOR EIGHT YEARS, AFTER WHICH THE BARRIER ZONE WOULD BE MOVED SLOWLY AHEAD OF SPREAD. INFESTATIONS ABOVE THE BARRIER ZONE WOULD BE ERADICATED THROUGH THE USE OF ULV MALATHION, TOXIC BAITS, AND STERILE MALE RELEASES. THE COST OF CONDUCTING SUCH A PROGRAM INCLUDES THE ERADICATION OF ISOLATED INFESTATIONS ABOVE THE BARRIER ZONE. THE COST OF MAINTAINING A BARRIER ZONE WAS ESTIMATED FROM A 1971 STUDY BY ECONOMIC RESEARCH SERVICE, USDA. IN ADDITION, IT WAS ASSUMED THAT AN AVERAGE OF 4 ISOLATED INFESTATIONS ABOVE THE BARRIER ZONE WOULD OCCUR EACH YEAR. THE COST OF ERADICATING THESE INFESTATIONS ADDED AN AVERAGE OF \$4.876/ACRE TO POTENTIAL COST(PC). THIS OPTION ALSO INCLUDES THE COST OF ERADICATING THE 1975-1976 INFESTATION IN LOS ANGELES COUNTY, CALIFORNIA.



MEDITERRANEAN FRUIT FLY - PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

CROP-AREA	YEARS TILL ARRIVAL OF PEST		YEARS TILL SPREAD OF PEST	POTENTIAL LOSSES MILLIONS OF DOLLARS	YEARS IN AREA	POTENTIAL COST DOLLARS PER ACRE	ACRES OF HOST CROP
	T1	T2	T2	PL	K	PC	
GUATEMALA							
PESSIM 1	-2	2		8.121	0	0.0	23500.
PESSIM 3	-2	2		8.121	0	0.0	23500.
SOTHERN MEXICO							
PESSIM 1	2	4		23.986	0	0.0	694698.
PESSIM 3	2	4		23.986	0	0.0	694698.
NORTHERN MEXICO							
PESSIM 1	4	8		48.044	0	0.0	1389418.
PESSIM 3	5	13		48.044	5	35.229	1389418.
TEXAS							
PESSIM 1	8	10		13.574	0	0.0	162900.
PESSIM 3	13	19		13.574	5	41.443	162900.
ARIZONA							
PESSIM 1	10	13		21.101	0	0.0	57700.
PESSIM 3	19	23		21.101	4	41.443	57700.
FLORIDA							
PESSIM 1	7	14		22.296	0	0.0	937065.
PESSIM 3	7	16		22.296	6	41.443	937065.
GEORGIA							
PESSIM 1	9	12		3.285	0	0.0	181100.
PESSIM 3	12	17		3.285	2	41.443	181100.
ALABAMA							
PESSIM 1	8	12		0.465	0	0.0	24400.
PESSIM 3	11	14		0.465	2	41.443	24400.
S. CAROLINA							
PESSIM 1	8	12		0.612	0	0.0	44300.
PESSIM 3	13	18		0.612	2	41.443	44300.
LOUISIANA							
PESSIM 1	9	12		0.208	0	0.0	10500.
PESSIM 3	12	15		0.208	1	41.443	10500.
MISSISSIPPI							
PESSIM 1	9	12		0.797	0	0.0	7540.
PESSIM 3	13	16		0.797	1	41.443	7540.
CALIFORNIA							
PESSIM 1	12	16		144.000	0	0.0	373000.
PESSIM 3	22	28		144.000	6	41.443	373000.
TOTALS OR AVERAGES	MIN	MAX			MAX		
PESSIM 1	-2	16		286.489	0	0.0	3906121.
PESSIM 3	-2	28		286.489	6	31.613	3906121.





MEDITERRANEAN FRUIT FLY - PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

YEAR	LOSSES PESSIM 1	LOSSES PESSIM 3	BENEFITS OF PESSIM 3	DISCOUNTED BENEFITS	ACCUMULATED DISCOUNTED BENEFITS
	ALL VALUES IN MILLIONS OF DOLLARS				
1	8.041	8.041	-0.000	-0.000	-0.000
2	8.123	8.123	-0.000	-0.000	-0.000
3	20.114	20.114	-0.000	-0.000	-0.000
4	32.109	32.105	0.004	0.003	0.003
5	32.583	32.112	0.471	0.292	0.295
6	56.129	32.155	23.974	13.533	13.828
7	79.678	32.585	47.093	24.166	37.994
8	80.779	36.491	43.687	20.380	58.375
9	87.371	56.262	31.109	13.194	71.568
10	99.170	76.773	22.398	8.635	80.203
11	117.407	85.570	31.837	11.159	91.362
12	141.145	96.526	44.619	14.217	105.579
13	143.881	101.921	41.960	12.154	117.734
14	214.487	103.494	110.993	29.228	146.962
15	285.063	107.386	177.678	42.535	189.497
16	286.475	114.502	171.973	37.427	226.923
17	286.489	120.783	165.706	32.784	259.708
18	286.489	121.359	165.130	29.700	289.408
19	286.489	121.389	165.100	26.995	316.404
20	286.489	121.597	164.892	24.510	340.914
21	286.489	131.939	154.550	20.885	361.799
22	286.489	142.295	144.194	17.714	379.513
23	286.489	142.796	143.693	16.048	395.560
24	286.489	148.875	137.614	13.971	409.532
25	286.489	214.489	72.000	6.645	416.177
26	286.489	280.103	6.386	0.536	416.713
27	286.489	286.180	0.309	0.024	416.736
28	286.489	286.475	0.014	0.001	416.737
29	286.489	286.488	0.001	0.000	416.737
30	286.489	286.489	0.000	0.000	416.737
31	286.489	286.489	0.000	0.000	416.737
32	286.489	286.489	0.000	0.000	416.737
33	286.489	286.489	0.000	0.000	416.737
TOTALS	6562.267	4494.881	2067.386	416.737	416.737



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 MEDITERRANEAN FRUIT FLY - PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976  
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PRESENT FUNDING, DOLLARS

PESSIM 1 0.  
 PESSIM 3 0.

ANTICIPATED CONTINGENCY MONEY, DOLLARS

YEAR 1 2 3

PESSIM 1 931000. 3000. 1000.  
 PESSIM 3 931000. 3000. 1000.

4 5 6 7 8  
 0. 0. 0. 0. 0.  
 0. 0. 0. 0. 0.

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MEDITERRANEAN FRUIT FLY - PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

	COST		COST DIFFERENCE PESSIM 3 -1	ADDITIONAL COST		CUMULATIVE COST
	PESSIM 1	PESSIM 3		DISCOUNTED	DISCOUNTED	
1	0.931	0.984	0.053	0.048	0.048	0.048
2	0.003	0.518	0.515	0.425	0.473	0.473
3	0.001	4.682	4.681	3.517	3.990	3.990
4	0.0	26.196	26.196	17.892	21.882	21.882
5	0.0	54.760	54.760	34.002	55.884	55.884
6	0.0	76.982	76.982	43.455	99.338	99.338
7	0.0	85.523	85.523	43.887	143.225	143.225
8	0.0	83.068	83.068	38.752	181.977	181.977
9	0.0	63.061	63.061	26.744	208.721	208.721
10	0.0	41.903	41.903	16.155	224.877	224.877
11	0.0	33.424	33.424	11.715	236.592	236.592
12	0.0	18.786	18.786	5.986	242.578	242.578
13	0.0	15.618	15.618	4.524	247.102	247.102
14	0.0	15.298	15.298	4.029	251.130	251.130
15	0.0	9.099	9.099	2.178	253.309	253.309
16	0.0	3.685	3.685	0.802	254.111	254.111
17	0.0	1.537	1.537	0.304	254.415	254.415
18	0.0	3.068	3.068	0.552	254.966	254.966
19	0.0	10.121	10.121	1.655	256.621	256.621
20	0.0	17.140	17.140	2.548	259.169	259.169
21	0.0	16.621	16.621	2.246	261.415	261.415
22	0.0	15.479	15.479	1.902	263.317	263.317
23	0.0	15.425	15.425	1.723	265.039	265.039
24	0.0	14.773	14.773	1.500	266.539	266.539
25	0.0	7.729	7.729	0.713	267.252	267.252
26	0.0	0.686	0.686	0.058	267.310	267.310
27	0.0	0.033	0.033	0.003	267.313	267.313
28	0.0	0.002	0.002	0.000	267.313	267.313
29	0.0	0.000	0.000	0.000	267.313	267.313
30	0.0	0.000	0.000	0.000	267.313	267.313
31	0.0	0.000	0.000	0.000	267.313	267.313
32	0.0	0.000	0.000	0.000	267.313	267.313
33	0.0	0.000	0.000	0.000	267.313	267.313
TOTALS	0.935	636.199	635.264	267.313		267.313

ALL VALUES IN MILLIONS OF DOLLARS



BENEFIT/COST ANALYSIS  
PLANT PROTECTION PROGRAMS USDA APHIS

MEDITERRANEAN FRUIT FLY - PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

SUMMARY OF  
PESSIM 3 OVER PESSIM 1

>>>>>>>> PRESENT VALUES <<<<<<<<<<<<

THE PRESENT VALUE OF THE BENEFITS OF SELECTING PESSIM 3 OVER PESSIM 1 DISCOUNTED AT 10.0 PERCENT INTEREST IS  
416.737 MILLIONS OF DOLLARS AND WILL ACCRUE OVER 33 YEARS.

THE PRESENT VALUE OF THE DIFFERENCE IN COSTS OF SELECTING PESSIM 3 OVER PESSIM 1 WHEN DISCOUNTED AT 10.0  
PERCENT INTEREST IS 267.313 MILLIONS OF DOLLARS AND WILL ACCRUE OVER 33 YEARS.

THE PRESENT VALUE OF THE BENEFIT/COST RATIO OF PESSIM 3 OVER PESSIM 1 IS 2:1 WHEN DISCOUNTED AT 10.0  
PERCENT INTEREST.

THE PRESENT VALUE OF THE NET BENEFITS OF SELECTING PESSIM 3 OVER PESSIM 1 IS 149.425 MILLIONS OF DOLLARS  
WHEN DISCOUNTED AT 10.0 PERCENT INTEREST.

>>>>>>>> UNDISCOUNTED VALUES <<<<<<<<<<<<

THE SUM OF THE UNDISCOUNTED BENEFITS OF SELECTING PESSIM 3 OVER PESSIM 1 IS 2067.386 MILLIONS OF DOLLARS  
WHEN ACCRUED OVER 33 YEARS, AND MAY CONTINUE TO ACCRUE AT 0.000 MILLIONS OF DOLLARS PER ANNUM FOREVER.

THE UNDISCOUNTED COST OF EXECUTING PESSIM 3 IS 636.199 MILLIONS OF DOLLARS WHEN SUMMED OVER 33 YEARS  
AND MAY CONTINUE TO ACCRUE AT 0.000 MILLIONS OF DOLLARS PER ANNUM FOREVER.

THE UNDISCOUNTED COST OF EXECUTING PESSIM 1 IS 0.935 MILLIONS OF DOLLARS WHEN SUMMED OVER 33 YEARS  
AND MAY CONTINUE TO ACCRUE AT 0.0 MILLIONS OF DOLLARS PER ANNUM FOREVER.

THE UNDISCOUNTED DIFFERENCE IN COST OF SELECTING PESSIM 3 OVER PESSIM 1 IS 635.264 MILLIONS OF DOLLARS  
WHEN SUMMED OVER 33 YEARS.

THE UNDISCOUNTED NET BENEFITS OF SELECTING PESSIM 3 OVER PESSIM 1 IS 1432.122 MILLIONS OF DOLLARS  
WHEN SUMMED OVER 33 AND 33 YEARS RESPECTFULLY.

THE UNDISCOUNTED BENEFIT/COST RATIO OF SELECTING PESSIM 3 OVER PESSIM 1 IS 3:1 WHEN SUMMED OVER 33  
AND 33 YEARS RESPECTFULLY.

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MEDITERRANEAN FRUIT FLY - PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

PESSIM 1 DO NOTHING - ERADICATION OF 1975 CALIF. INFESTATION SUCCESSFUL.

PESSIMISTIC

OPTION 1 ASSUMES THAT NEITHER GOVERNMENTS OF GUATEMALA, MEXICO, NOR THE UNITED STATES WILL CONDUCT A PROGRAM TO RETARD THE SPREAD OF THE MEDITERRANEAN FRUIT FLY FROM CENTRAL AMERICA TO THE SUSCEPTIBLE AREAS IN NORTH AMERICA AND MEXICO. A FURTHER ASSUMPTION IS THAT THE PRODUCERS OF THE HOST CROPS WILL EMPLOY EXISTING PEST CONTROL TECHNOLOGY SIMILAR TO THAT IN USE IN THE MEDITERRANEAN COUNTRIES, TO COMBAT THIS PEST. UNREALIZED YIELDS WILL, THEREFORE, BE HELD TO A LEVEL COMMENSURATE WITH THE PRODUCER'S PERCEIVED BENEFITS FROM SUCH CONTROL MEASURES. THE POTENTIAL LOSSES GIVEN BELOW INCLUDE THE VALUE OF UNREALIZED YIELDS PLUS THE COST OF CONTROL INCURRED BY THE FARMER IN PROTECTING HIS CROPS. THE VALUES USED AS INPUTS TO THIS BENEFIT/COST ANALYSIS ARE CRUDE ESTIMATES AND REPRESENT EXPEDIENT ESTIMATES TO PERMIT MAKING A FIRST APPROXIMATION OF THE BENEFITS AND COSTS OF CONDUCTING A MEDITERRANEAN FRUIT FLY PROGRAM IN EITHER MEXICO OR GUATEMALA. THE 'DO NOTHING' OPTION IS INCLUDED TO FORM A BASIS FOR ESTIMATING THE BENEFITS AND COSTS OF THE OTHER OPTIONS. IT WAS ASSUMED THAT EACH ACRE OF HOST CROP WOULD RECEIVE 4 INSECTICIDE APPLICATIONS AT \$3.50/ACRE/ APPLICATION EXCEPT FOR MEXICO AND GUATEMALA WHERE ONLY 2 APPLICATIONS WERE ASSUMED. OWING TO THE LOWER TECHNOLOGICAL AGRICULTURE BASE, IT WAS FURTHER ASSUMED THAT THE INFESTATION IN CALIFORNIA WOULD BE ERADICATED AT A COST OF \$935000 OVER THE NEXT THREE YEARS.

PESSIM 4 TEXAS-MEXICO BARRIER ZONE - ALONG RIO GRANDE RIVER MARCH 1976

PESSIMISTIC

OPTION 4 ASSUMES THAT NO EFFORT WILL BE MADE TO RETARD SPREAD OF THE MEDITERRANEAN FRUIT FLY BEFORE IT REACHES THE TEXAS-MEXICO BORDER. THE SCENARIO IS SIMILAR TO THAT FOLLOWED FOR CITRUS BLACKFLY--WHERE A BARRIER ZONE WAS MAINTAINED SOUTH OF THE RIO GRANDE RIVER FOR MANY YEARS. THE PER ACRE COST OF MAINTAINING A BARRIER ZONE WAS ASSUMED TO BE CONSTANT EXCEPT FOR GUATEMALA AND MEXICO, WHERE BECAUSE OF LOWER LABOR COSTS PC AS REDUCED 15 PERCENT. PROGRAM COSTS AND LOSSES TO THE MEDITERRANEAN FRUIT FLY ARE EXPEDIENT ESTIMATES TO PERMIT A FIRST APPROXIMATION OF THE BENEFITS AND COSTS OF A PROGRAM TO RETARD THE NORTHWARD SPREAD THROUGH MEXICO AND INTO THE UNITED STATES. THE SAME ASSUMPTIONS WERE MADE IN PREPARING OPTION 4 AS WERE MADE FOR OPTIONS 2 AND 3 -- THE ONLY DIFFERENCES BEING THAT NO EFFORT TO RETARD SPREAD BELOW THE TEXAS-MEXICO BORDER WOULD BE MADE. AN IMPORTANT ASSUMPTION FOR ALL THESE OPTIONS IS THAT EACH STATE, AS WELL AS GUATEMALA AND MEXICO, WOULD CONDUCT A PROGRAM TO PROTECT THEIR COUNTRIES HOST CROPS.



MEDITERRANEAN FRUIT FLY - PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

CROP-AREA	YEARS TILL ARRIVAL OF PEST		YEARS TILL SPREAD OF PEST	POTENTIAL LOSSES MILLIONS OF DOLLARS PL	YEARS IN AREA K	POTENTIAL COST DOLLARS PER ACRE PC	ACRES OF HOST CROP
	T1	T2					
GUATEMALA							
PESSIM 1	-2	2		8.121	0	0.0	23500.
PESSIM 4	-2	2		8.121	0	0.0	23500.
SOTHERN MEXICO							
PESSIM 1	2	4		23.986	0	0.0	694698.
PESSIM 4	2	4		23.986	0	0.0	694698.
NORTHERN MEXICO							
PESSIM 1	4	8		48.044	0	0.0	1389418.
PESSIM 4	4	9		48.044	0	0.0	1389418.
TEXAS							
PESSIM 1	8	10		13.574	0	0.0	162900.
PESSIM 4	16	22		13.574	5	41.443	162900.
ARIZONA							
PESSIM 1	10	13		21.101	0	0.0	57700.
PESSIM 4	19	23		21.101	4	41.443	57700.
FLORIDA							
PESSIM 1	7	14		22.296	0	0.0	937065.
PESSIM 4	6	15		22.296	6	41.443	937065.
GEORGIA							
PESSIM 1	9	12		3.285	0	0.0	181100.
PESSIM 4	11	13		3.285	2	41.443	181100.
ALABAMA							
PESSIM 1	8	12		0.465	0	0.0	24400.
PESSIM 4	11	14		0.465	2	41.443	24400.
S. CAROLINA							
PESSIM 1	8	12		0.612	0	0.0	44300.
PESSIM 4	11	16		0.612	2	41.443	44300.
LOUISIANA							
PESSIM 1	9	12		0.208	0	0.0	10500.
PESSIM 4	11	16		0.208	1	41.443	10500.
MISSISSIPPI							
PESSIM 1	9	12		0.797	0	0.0	7540.
PESSIM 4	12	15		0.797	1	41.443	7540.
CALIFORNIA							
PESSIM 1	12	16		144.000	0	0.0	373000.
PESSIM 4	21	27		144.000	6	41.443	373000.
TOTALS OR AVERAGES	MIN	MAX			MAX		
PESSIM 1	-2	16		286.489	0	0.0	3906121.
PESSIM 4	-2	27		286.489	6	19.082	3906121.



MEDITERRANEAN FRUIT FLY - PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

YEAR	LOSSES PESSIM 1	LOSSES PESSIM 4	BENEFITS OF PESSIM 4	DISCOUNTED BENEFITS	ACCUMULATED DISCOUNTED BENEFITS
1	8.041	8.041	-0.000	-0.000	-0.000
2	8.123	8.123	-0.000	-0.000	-0.000
3	20.114	20.114	-0.000	-0.000	-0.000
4	32.109	32.109	-0.000	-0.000	-0.000
5	32.583	32.298	0.285	0.177	0.177
6	56.129	38.681	17.448	9.849	10.026
7	79.678	73.596	6.082	3.121	13.146
8	80.179	80.093	0.085	0.040	13.186
9	87.371	81.135	6.236	2.645	15.831
10	99.170	86.045	13.125	5.060	20.891
11	117.407	96.553	20.854	7.309	28.201
12	141.145	103.125	38.020	12.114	40.315
13	143.881	106.191	37.691	10.918	51.233
14	214.487	107.649	106.838	28.134	79.367
15	285.063	107.809	177.255	42.434	121.800
16	286.475	107.815	178.660	38.882	160.682
17	286.489	107.843	178.646	35.344	196.027
18	286.489	108.416	178.073	32.028	228.055
19	286.489	114.603	171.886	28.105	256.160
20	286.489	120.996	165.493	24.600	280.760
21	286.489	131.924	154.565	20.887	301.646
22	286.489	142.588	143.901	17.678	319.324
23	286.489	148.873	137.616	15.369	334.693
24	286.489	214.489	72.000	7.310	342.003
25	286.489	280.103	6.386	0.589	342.592
26	286.489	286.180	0.309	0.026	342.618
27	286.489	286.475	0.014	0.001	342.620
28	286.489	286.488	0.001	0.000	342.620
29	286.489	286.489	0.000	0.000	342.620
30	286.489	286.489	0.000	0.000	342.620
31	286.489	286.489	0.000	0.000	342.620
32	286.489	286.489	0.000	0.000	342.620
TOTALS	6275.778	4464.310	1811.469	342.620	342.620

ALL VALUES IN MILLIONS OF DOLLARS



MEDITERRANEAN FRUIT FLY - PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

PRESENT FUNDING, DOLLARS  
 PESSIM 1 0.  
 PESSIM 4 0.

ANTICIPATED CONTINGENCY MONEY, DOLLARS							
YEAR	1	2	3	4	5	6	7
PESSIM 1	931000.	3000.	1000.	0.	0.	0.	0.
PESSIM 4	931000.	3000.	1000.	0.	0.	0.	0.





MEDITERRANEAN FRUIT FLY - PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

	COST		COST DIFFERENCE PESSIM 4 - 1	ADDITIONAL COST		CUMULATIVE COST DISCOUNTED
	PESSIM 1	PESSIM 4		DISCOUNTED	DISCOUNTED	
ALL VALUES IN MILLIONS OF DOLLARS						
1	0.931	0.961	0.030	0.027	0.027	0.027
2	0.003	0.234	0.231	0.191	0.219	0.219
3	0.001	1.723	1.722	1.294	1.513	1.513
4	0.0	10.266	10.266	7.012	8.525	8.525
5	0.0	28.568	28.568	17.738	26.263	26.263
6	0.0	37.109	37.109	20.947	47.210	47.210
7	0.0	38.573	38.573	19.794	67.004	67.004
8	0.0	38.573	38.573	17.995	84.999	84.999
9	0.0	37.110	37.110	15.738	100.737	100.737
10	0.0	32.373	32.373	12.481	113.218	113.218
11	0.0	18.990	18.990	6.656	119.874	119.874
12	0.0	8.105	8.105	2.582	122.457	122.457
13	0.0	2.755	2.755	0.798	123.255	123.255
14	0.0	3.728	3.728	0.982	124.236	124.236
15	0.0	6.466	6.466	1.548	125.784	125.784
16	0.0	6.794	6.794	1.478	127.263	127.263
17	0.0	8.617	8.617	1.705	128.968	128.968
18	0.0	16.548	16.548	2.976	131.944	131.944
19	0.0	20.539	20.539	3.358	135.303	135.303
20	0.0	18.092	18.092	2.689	137.992	137.992
21	0.0	16.665	16.665	2.252	140.244	140.244
22	0.0	15.449	15.449	1.898	142.142	142.142
23	0.0	14.773	14.773	1.650	143.792	143.792
24	0.0	7.729	7.729	0.785	144.576	144.576
25	0.0	0.686	0.686	0.063	144.640	144.640
26	0.0	0.033	0.033	0.003	144.642	144.642
27	0.0	0.002	0.002	0.000	144.642	144.642
28	0.0	0.000	0.000	0.000	144.642	144.642
29	0.0	0.000	0.000	0.000	144.642	144.642
30	0.0	0.000	0.000	0.000	144.642	144.642
31	0.0	0.000	0.000	0.000	144.642	144.642
32	0.0	0.000	0.000	0.000	144.642	144.642
TOTALS	0.935	391.462	390.527	144.642	144.642	144.642



## MEDITERRANEAN FRUIT FLY - PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

>>>>>> PRESENT VALUES <<<<<<

THE UNDISCOUNTED BENEFIT/COST RATIO OF SELECTING PESSIM 4 OVER PESSIM 1 IS 5:1 WHEN SUMMED OVER 32 AND 32 YEARS RESPECTFULLY.



MEDITERRANEAN FRUIT FLY - PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

PESSIM 1 DO NOTHING - ERADICATION OF 1975 CALIF. INFESTATION SUCCESSFUL.

PESSIMISTIC

OPTION 1 ASSUMES THAT NEITHER GOVERNMENTS OF GUATEMALA, MEXICO, NOR THE UNITED STATES WILL CONDUCT A PROGRAM TO RETARD THE SPREAD OF THE MEDITERRANEAN FRUIT FLY FROM CENTRAL AMERICA TO THE SUSCEPTIBLE AREAS IN NORTH AMERICA AND MEXICO. A FURTHER ASSUMPTION IS THAT THE PRODUCERS OF THE HOST CROPS WILL EMPLOY EXISTING PEST CONTROL TECHNOLOGY SIMILAR TO THAT IN USE IN THE MEDITERRANEAN COUNTRIES. TO COMBAT THIS PEST, UNREALIZED YIELDS WILL, THEREFORE, BE HELD TO A LEVEL COMMENSURATE WITH THE PRODUCER'S PERCEIVED BENEFITS FROM SUCH CONTROL MEASURES. THE POTENTIAL LOSSES GIVEN BELOW INCLUDE THE VALUE OF UNREALIZED YIELDS PLUS THE COST OF CONTROL INCURRED BY THE FARMER IN PROTECTING HIS CROPS. THE VALUES USED AS INPUTS TO THIS BENEFIT/COST ANALYSIS ARE CRUDE ESTIMATES AND REPRESENT EXPEDIENT ESTIMATES TO PERMIT MAKING A FIRST APPROXIMATION OF THE BENEFITS AND COSTS OF CONDUCTING A MEDITERRANEAN FRUIT FLY PROGRAM IN EITHER MEXICO OR GUATEMALA. THE 'DO NOTHING' OPTION IS INCLUDED TO FORM A BASIS FOR ESTIMATING THE BENEFITS AND COSTS OF THE OTHER OPTIONS. IT WAS ASSUMED THAT EACH ACRE OF HOST CROP WOULD RECEIVE 4 INSECTICIDE APPLICATIONS AT \$3.50/ACRE/ APPLICATION EXCEPT FOR MEXICO AND GUATEMALA WHERE ONLY 2 APPLICATIONS WERE ASSUMED. DUE TO THE LOWER TECHNOLOGICAL AGRICULTURE BASE, IT WAS FURTHER ASSUMED THAT THE INFESTATION IN CALIFORNIA WOULD BE ERADICATED AT A COST OF \$935000 OVER THE NEXT THREE YEARS.

PESSIM 2 GUATEMALA - BARRIER ZONE IN GUATEMALA MARCH 1976

PESSIMISTIC

OPTION 2 ASSUMES THAT A BARRIER ZONE WILL BE ERECTED IN GUATEMALA TO PREVENT OR GREATLY RETARD THE NORTHWARD SPREAD OF THE MEDITERRANEAN FRUIT FLY TO BELIZE AND MEXICO. THE BARRIER ZONE WOULD ESSENTIALLY ERADICATE THE MEDITERRANEAN FRUIT FLY FROM A ZONE 60 MILES DEEP, USING AN INTEGRATION OF TOXIC BAITS, ULV MALATHION, TRAPS BAITED WITH LURES, CULTURAL PRACTICES, STERILE MALE RELEASES, AND QUARANTINE MEASURES. BREACHING OF THE GUATEMALA BARRIER WOULD BE FOLLOWED BY A BARRIER ZONE IN THE ISTHMX OF TEHUANTEPEC. BREACHING OF THE BARRIER ZONE AT TEHUANTEPEC WOULD BE FOLLOWED BY A GRADUAL SHIFTING OF A BARRIER ZONE AS THE INFESTATION SLOWLY MOVED NORTHWARD AND FINALLY INFESTED ALL OF ITS ECOLOGICAL RANGE IN NORTH AMERICA. THE COST OF MAINTAINING A BARRIER ZONE WAS ESTIMATED FROM A 1971 STUDY BY ECONOMIC RESEARCH SERVICE. IN ADDITION, IT WAS ASSUMED THAT AN AVERAGE OF 4 ISOLATED INFESTATIONS ABOVE THE BARRIER ZONE WOULD OCCUR EACH YEAR. THE COST OF ERADICATING THESE INFESTATIONS ADDED AN AVERAGE OF \$4.876/ACRE TO POTENTIAL COSTS (PC). THIS OPTION ALSO INCLUDES THE COST OF ERADICATING THE 1975 INFESTATION IN LOS ANGELES COUNTY, CALIFORNIA. THE TOTAL COST OF ERADICATING THIS INFESTATION WAS ESTIMATED AT \$931,000 DURING 1976 WITH AN ADDITIONAL \$3,000 BEING SPENT IN 1977 AND \$1,000 IN 1978 FOR SURVEY AND FOLLOWUP WORK.



MEDITERRANEAN FRUIT FLY - PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

CROP-AREA	YEARS TILL ARRIVAL OF PEST		YEARS TILL SPREAD OF PEST		POTENTIAL LOSSES MILLIONS OF DOLLARS		YEARS IN AREA		POTENTIAL COST DOLLARS PER ACRE		ACRES OF HOST CROP	
	T1	T2	T1	T2	PL	PC	K	PC	PC	PC	PC	PC
GUATEMALA												
PESSIM 1	-2	2			8.121	0.0	0	0.0			23500.	
PESSIM 2	-2	5			8.121	35.229	4	35.229			23500.	
SOTHERN MEXICO												
PESSIM 1	2	4			23.986	0.0	0	0.0			694698.	
PESSIM 2	5	14			23.986	35.229	5	35.229			694698.	
NORTHERN MEXICO												
PESSIM 1	4	8			48.044	0.0	0	0.0			1389418.	
PESSIM 2	14	22			48.044	35.229	5	35.229			1389418.	
TEXAS												
PESSIM 1	8	10			13.574	0.0	0	0.0			162900.	
PESSIM 2	16	28			13.574	41.443	5	41.443			162900.	
ARIZONA												
PESSIM 1	10	13			21.101	0.0	0	0.0			57700.	
PESSIM 2	24	28			21.101	41.443	4	41.443			57700.	
FLORIDA												
PESSIM 1	7	14			22.296	0.0	0	0.0			937065.	
PESSIM 2	8	18			22.296	41.443	6	41.443			937065.	
GEORGIA												
PESSIM 1	9	12			3.285	0.0	0	0.0			181100.	
PESSIM 2	14	18			3.285	41.443	2	41.443			181100.	
ALABAMA												
PESSIM 1	8	12			0.465	0.0	0	0.0			24400.	
PESSIM 2	17	21			0.465	41.443	2	41.443			24400.	
S. CAROLINA												
PESSIM 1	8	12			0.612	0.0	0	0.0			44300.	
PESSIM 2	20	25			0.612	41.443	2	41.443			44300.	
LOUISIANA												
PESSIM 1	9	12			0.208	0.0	0	0.0			10500.	
PESSIM 2	12	15			0.208	41.443	1	41.443			10500.	
MISSISSIPPI												
PESSIM 1	9	12			0.797	0.0	0	0.0			7540.	
PESSIM 2	13	16			0.797	41.443	1	41.443			7540.	
CALIFORNIA												
PESSIM 1	12	16			144.000	0.0	0	0.0			373000.	
PESSIM 2	26	32			144.000	41.443	6	41.443			373000.	
TOTALS OR AVERAGES												
	MIN	MAX					MAX					
PESSIM 1	-2	16			286.489	0.0	0	0.0			3906121.	
PESSIM 2	-2	32			286.489	38.090	6	38.090			3906121.	







MARCH 1976

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MEDITERRANEAN FRUIT FLY - PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976  
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	COST		COST DIFFERENCE PESSIM 2 - 1	ADDITIONAL COST		CUMULATIVE COST DISCOUNTED
	PESSIM 1	PESSIM 2		DISCOUNTED	DISCOUNTED	
ALL VALUES IN MILLIONS OF DOLLARS						
1	0.931	1.603	0.672	0.611	0.611	0.611
2	0.003	0.328	0.325	0.268	0.880	0.880
3	0.001	1.127	1.126	0.846	1.725	1.725
4	0.0	6.625	6.625	4.525	6.250	6.250
5	0.0	18.953	18.953	11.768	18.018	18.018
6	0.0	28.682	28.682	16.190	34.208	34.208
7	0.0	43.599	43.599	22.373	56.581	56.581
8	0.0	56.888	56.888	26.539	83.120	83.120
9	0.0	55.865	55.865	23.692	106.812	106.812
10	0.0	45.045	45.045	17.367	124.179	124.179
11	0.0	39.430	39.430	13.820	137.999	137.999
12	0.0	38.137	38.137	12.152	150.151	150.151
13	0.0	44.408	44.408	12.864	163.015	163.015
14	0.0	53.931	53.931	14.202	177.216	177.216
15	0.0	57.036	57.036	13.654	190.870	190.870
16	0.0	53.526	53.526	11.649	202.519	202.519
17	0.0	48.470	48.470	9.590	212.109	212.109
18	0.0	31.009	31.009	5.577	217.686	217.686
19	0.0	11.348	11.348	1.855	219.542	219.542
20	0.0	7.132	7.132	1.060	220.602	220.602
21	0.0	7.223	7.223	0.976	221.578	221.578
22	0.0	6.836	6.836	0.840	222.418	222.418
23	0.0	11.544	11.544	1.289	223.707	223.707
24	0.0	17.470	17.470	1.774	225.481	225.481
25	0.0	17.860	17.860	1.648	227.129	227.129
26	0.0	16.665	16.665	1.398	228.528	228.528
27	0.0	15.452	15.452	1.179	229.706	229.706
28	0.0	14.774	14.774	1.024	230.731	230.731
29	0.0	7.729	7.729	0.487	231.218	231.218
30	0.0	0.686	0.686	0.039	231.257	231.257
31	0.0	0.033	0.033	0.002	231.259	231.259
32	0.0	0.002	0.002	0.000	231.259	231.259
33	0.0	0.000	0.000	0.000	231.259	231.259
34	0.0	0.000	0.000	0.000	231.259	231.259
35	0.0	0.000	0.000	0.000	231.259	231.259
36	0.0	0.000	0.000	0.000	231.259	231.259
37	0.0	0.000	0.000	0.000	231.259	231.259
TOTALS	0.935	759.415	758.479	231.259		231.259



BENEFIT/COST ANALYSIS  
PLANT PROTECTION PROGRAMS USDA APHIS

MEDITERRANEAN FRUIT FLY - PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

SUMMARY OF  
PESSIM 2 OVER PESSIM 1

>>>>>>> PRESENT VALUES <<<<<<<<<

THE PRESENT VALUE OF THE BENEFITS OF SELECTING PESSIM 2 OVER PESSIM 1 DISCOUNTED AT 10.0 PERCENT INTEREST IS 716.602 MILLIONS OF DOLLARS AND WILL ACCRUE OVER 37 YEARS.

THE PRESENT VALUE OF THE DIFFERENCE IN COSTS OF SELECTING PESSIM 2 OVER PESSIM 1 WHEN DISCOUNTED AT 10.0 PERCENT INTEREST IS 231.259 MILLIONS OF DOLLARS AND WILL ACCRUE OVER 37 YEARS.

THE PRESENT VALUE OF THE BENEFIT/COST RATIO OF PESSIM 2 OVER PESSIM 1 IS 3:1 WHEN DISCOUNTED AT 10.0 PERCENT INTEREST.

THE PRESENT VALUE OF THE NET BENEFITS OF SELECTING PESSIM 2 OVER PESSIM 1 IS 485.343 MILLIONS OF DOLLARS WHEN DISCOUNTED AT 10.0 PERCENT INTEREST.

>>>>>>> UNDISCOUNTED VALUES <<<<<<<<

THE SUM OF THE UNDISCOUNTED BENEFITS OF SELECTING PESSIM 2 OVER PESSIM 1 IS 3472.524 MILLIONS OF DOLLARS WHEN ACCRUED OVER 37 YEARS, AND MAY CONTINUE TO ACCRUE AT 0.000 MILLIONS OF DOLLARS PER ANNUM FOREVER.

THE UNDISCOUNTED COST OF EXECUTING PESSIM 2 IS 759.415 MILLIONS OF DOLLARS WHEN SUMMED OVER 37 YEARS AND MAY CONTINUE TO ACCRUE AT 0.000 MILLIONS OF DOLLARS PER ANNUM FOREVER.

THE UNDISCOUNTED COST OF EXECUTING PESSIM 1 IS 0.935 MILLIONS OF DOLLARS WHEN SUMMED OVER 37 YEARS AND MAY CONTINUE TO ACCRUE AT 0.0 MILLIONS OF DOLLARS PER ANNUM FOREVER.

THE UNDISCOUNTED DIFFERENCE IN COST OF SELECTING PESSIM 2 OVER PESSIM 1 IS 758.479 MILLIONS OF DOLLARS WHEN SUMMED OVER 37 YEARS.

THE UNDISCOUNTED NET BENEFITS OF SELECTING PESSIM 2 OVER PESSIM 1 IS 2714.044 MILLIONS OF DOLLARS WHEN SUMMED OVER 37 AND 37 YEARS RESPECTFULLY.

THE UNDISCOUNTED BENEFIT/COST RATIO OF SELECTING PESSIM 2 OVER PESSIM 1 IS 5:1 WHEN SUMMED OVER 37 AND 37 YEARS RESPECTFULLY.



MEDITERRANEAN FRUIT FLY - PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

PESSIM 3 MEXICO BARRIER ZONE IN TEHAUANTEPEC MARCH 1976

PESSIMISTIC -----  
OPTION 3 ASSUMES THAT A BARRIER ZONE WILL BE ERECTED AT THE ISTHMUS OF TEHUANTEPEC, MEXICO, TO PREVENT OR GREATLY RETARD THE NORTHWARD SPREAD OF THE MEDITERRANEAN FRUIT FLY. THE BARRIER ZONE WOULD MEASURE 60-MILES-DEEP AND 80-MILES-ACROSS. THE MEDITERRANEAN FRUIT FLY POPULATION IN THE BARRIER ZONE WOULD BE MAINTAINED AT NEAR ZERO LEVEL THROUGH THE USE OF TRAPS, ULV MALATHION, TOXIC BAITS, CULTURAL PRACTICES AND QUARANTINE MEASURES. SUCH A BARRIER ZONE, IT WAS ASSUMED, WOULD PREVENT SPREAD FOR EIGHT YEARS, AFTER WHICH THE BARRIER ZONE WOULD BE MOVED SLOWLY AHEAD OF SPREAD. INFESTATIONS ABOVE THE BARRIER ZONE WOULD BE ERADICATED THROUGH THE USE OF ULV MALATHION, TOXIC BAITS, AND STERILE MALE RELEASES. THE COST OF CONDUCTING SUCH A PROGRAM INCLUDES THE ERADICATION OF ISOLATED INFESTATIONS ABOVE THE BARRIER ZONE. THE COST OF MAINTAINING A BARRIER ZONE WAS ESTIMATED FROM A 1971 STUDY BY ECONOMIC RESEARCH SERVICE, USDA. IN ADDITION, IT WAS ASSUMED THAT AN AVERAGE OF 4 ISOLATED INFESTATIONS ABOVE THE BARRIER ZONE WOULD OCCUR EACH YEAR. THE COST OF ERADICATING THESE INFESTATIONS ADDED AN AVERAGE OF \$4.876/ACRE TO POTENTIAL COST(PC). THIS OPTION ALSO INCLUDES THE COST OF ERADICATING THE 1975-1976 INFESTATION IN LOS ANGELES COUNTY, CALIFORNIA.  
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PESSIM 4 TEXAS-MEXICO BARRIER ZONE - ALONG RIO GRANDE RIVER MARCH 1976

PESSIMISTIC -----  
OPTION 4 ASSUMES THAT NO EFFORT WILL BE MADE TO RETARD SPREAD OF THE MEDITERRANEAN FRUIT FLY BEFORE IT REACHES THE TEXAS-MEXICO BORDER. THE SCENARIO IS SIMILAR TO THAT FOLLOWED FOR CITRUS BLACKFLY--WHERE A BARRIER ZONE WAS MAINTAINED SOUTH OF THE RIO GRANDE RIVER FOR MANY YEARS. THE PER ACRE COST OF MAINTAINING A BARRIER ZONE WAS ASSUMED TO BE CONSTANT EXCEPT FOR GUATEMALA AND MEXICO, WHERE BECAUSE OF LOWER LABOR COSTS PC AS REDUCED 15 PERCENT. PROGRAM COSTS AND LOSSES TO THE MEDITERRANEAN FRUIT FLY ARE EXPEDIENT ESTIMATES TO PERMIT A FIRST APPROXIMATION OF THE BENEFITS AND COSTS OF A PROGRAM TO RETARD THE NORTHWARD SPREAD THROUGH MEXICO AND INTO THE UNITED STATES. THE SAME ASSUMPTIONS WERE MADE IN PREPARING OPTION 4 AS WERE MADE FOR OPTIONS 2 AND 3 -- THE ONLY DIFFERENCES BEING THAT NO EFFORT TO RETARD SPREAD BELOW THE TEXAS-MEXICO BORDER WOULD BE MADE. AN IMPORTANT ASSUMPTION FOR ALL THESE OPTIONS IS THAT EACH STATE, AS WELL AS GUATEMALA AND MEXICO, WOULD CONDUCT A PROGRAM TO PROTECT THEIR COUNTRIES HOST CROPS.  
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## MEDITERRANEAN FRUIT FLY - PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

CROP-AREA	YEARS TILL ARRIVAL OF PEST		YEARS TILL SPREAD OF PEST		POTENTIAL LOSSES MILLIONS OF DOLLARS		YEARS IN AREA		POTENTIAL COST DOLLARS PER ACRE		ACRES OF HOST CROP	
	T1	T2	T1	T2	PL	PC	K	PC	PC	PC	PC	PC
GUATEMALA												
PESSIM 3	-2	2			8.121		0	0.0			23500.	
PESSIM 4	-2	2			8.121		0	0.0			23500.	
SOTHERN MEXICO												
PESSIM 3	2	4			23.986		0	0.0			694698.	
PESSIM 4	2	4			23.986		0	0.0			694698.	
NORTHERN MEXICO												
PESSIM 3	5	13			48.044		5	35.229			1389418.	
PESSIM 4	4	9			48.044		0	0.0			1389418.	
TEXAS												
PESSIM 3	13	19			13.574		5	41.443			162900.	
PESSIM 4	16	22			13.574		5	41.443			162900.	
ARIZONA												
PESSIM 3	19	23			21.101		4	41.443			57700.	
PESSIM 4	19	23			21.101		4	41.443			57700.	
FLORIDA												
PESSIM 3	7	16			22.296		6	41.443			937065.	
PESSIM 4	6	15			22.296		6	41.443			937065.	
GEORGIA												
PESSIM 3	12	17			3.285		2	41.443			181100.	
PESSIM 4	11	13			3.285		2	41.443			181100.	
ALABAMA												
PESSIM 3	11	14			0.465		2	41.443			24400.	
PESSIM 4	11	14			0.465		2	41.443			24400.	
S. CAROLINA												
PESSIM 3	13	18			0.612		2	41.443			44300.	
PESSIM 4	11	16			0.612		2	41.443			44300.	
LOUISIANA												
PESSIM 3	12	15			0.208		1	41.443			10500.	
PESSIM 4	11	16			0.208		1	41.443			10500.	
MISSISSIPPI												
PESSIM 3	13	16			0.797		1	41.443			7540.	
PESSIM 4	12	15			0.797		1	41.443			7540.	
CALIFORNIA												
PESSIM 3	22	28			144.000		6	41.443			373000.	
PESSIM 4	21	27			144.000		6	41.443			373000.	
TOTALS OR AVERAGES												
	MIN	MAX					MAX					
PESSIM 3	-2	28			286.489		6	31.613			3906121.	
PESSIM 4	-2	27			286.489		6	19.082			3906121.	



MEDITERRANEAN FRUIT FLY - PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

YEAR	LOSSES PESSIM 3	LOSSES PESSIM 4	BENEFITS OF PESSIM 4	ALL VALUES IN MILLIONS OF DOLLARS	
				DISCOUNTED BENEFITS	ACCUMULATED DISCOUNTED BENEFITS
1	8.041	8.041	0.000	0.000	0.000
2	8.123	8.123	0.000	0.000	0.000
3	20.114	20.114	-0.000	-0.000	-0.000
4	32.105	32.109	-0.004	-0.003	-0.003
5	32.112	32.298	-0.186	-0.115	-0.118
6	32.155	38.681	-6.526	-3.684	-3.802
7	32.585	73.596	-41.011	-21.045	-24.848
8	36.491	80.093	-43.602	-20.341	-45.188
9	56.262	81.135	-24.873	-10.549	-55.737
10	76.773	86.045	-9.272	-3.575	-59.312
11	85.570	96.553	-10.984	-3.850	-63.162
12	96.526	103.125	-6.599	-2.103	-65.264
13	101.921	106.191	-4.269	-1.237	-66.501
14	103.494	107.649	-4.155	-1.094	-67.595
15	107.386	107.809	-0.423	-0.101	-67.696
16	114.502	107.815	6.687	1.455	-66.241
17	120.783	107.843	12.940	2.560	-63.681
18	121.359	108.416	12.943	2.328	-61.353
19	121.389	114.603	6.786	1.110	-60.244
20	121.597	120.996	0.601	0.089	-60.154
21	131.939	131.924	0.015	0.002	-60.152
22	142.295	142.588	-0.294	-0.036	-60.188
23	142.796	148.873	-6.077	-0.679	-60.867
24	148.875	214.489	-65.614	-6.662	-67.528
25	214.489	280.103	-65.614	-6.056	-73.584
26	280.103	286.180	-6.077	-0.510	-74.094
27	286.180	286.475	-0.295	-0.023	-74.117
28	286.475	286.488	-0.014	-0.001	-74.118
29	286.488	286.489	-0.001	-0.000	-74.118
30	286.489	286.489	-0.000	-0.000	-74.118
31	286.489	286.489	-0.000	-0.000	-74.118
32	286.489	286.489	-0.000	-0.000	-74.118
33	286.489	286.489	-0.000	-0.000	-74.118
TOTALS	4494.881	4750.799	-255.918	-74.118	-74.118



MEDITERRANEAN FRUIT FLY - PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

PRESENT FUNDING, DOLLARS

PESSIM 3 0.  
PESSIM 4 0.

ANTICIPATED CONTINGENCY MONEY, DOLLARS

YEAR	1	2	3	4	5	6	7	8
PESSIM 3	931000.	3000.	1000.	0.	0.	0.	0.	0.
PESSIM 4	931000.	3000.	1000.	0.	0.	0.	0.	0.



MEDITERRANEAN FRUIT FLY - PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

	COST		COST		COST		COST		CUMULATIVE	
	PESSIM 3	PESSIM 4	PESSIM 3	PESSIM 4	DIFFERENCE PESSIM 4 - 3	ADDITIONAL COST DISCOUNTED	ADDITIONAL COST DISCOUNTED	DISCOUNTED	DISCOUNTED	DISCOUNTED
1	0.984	0.961			-0.023	-0.021		-0.021		-0.021
2	0.518	0.234			-0.283	-0.234		-0.255		-0.255
3	4.682	1.723			-2.958	-2.223		-2.477		-2.477
4	26.196	10.266			-15.929	-10.880		-13.357		-13.357
5	54.760	28.568			-26.192	-16.263		-29.621		-29.621
6	76.982	37.109			-39.874	-22.508		-52.128		-52.128
7	85.523	38.573			-46.950	-24.093		-76.221		-76.221
8	83.068	38.573			-44.494	-20.757		-96.978		-96.978
9	63.061	37.110			-25.952	-11.006		-107.984		-107.984
10	41.903	32.373			-9.530	-3.674		-111.658		-111.658
11	33.424	18.990			-14.434	-5.059		-116.718		-116.718
12	18.786	8.105			-10.681	-3.403		-120.121		-120.121
13	15.618	2.755			-12.863	-3.726		-123.847		-123.847
14	15.298	3.728			-11.570	-3.047		-126.894		-126.894
15	9.099	6.466			-2.633	-0.630		-127.524		-127.524
16	3.685	6.794			3.108	0.676		-126.848		-126.848
17	1.537	8.617			7.080	1.401		-125.447		-125.447
18	3.068	16.548			13.480	2.425		-123.022		-123.022
19	10.121	20.539			10.418	1.704		-121.319		-121.319
20	17.140	18.092			0.952	0.141		-121.177		-121.177
21	16.621	16.665			0.045	0.006		-121.171		-121.171
22	15.479	15.449			-0.030	-0.004		-121.175		-121.175
23	15.425	14.773			-0.652	-0.073		-121.248		-121.248
24	14.773	7.729			-7.044	-0.715		-121.963		-121.963
25	7.729	0.686			-7.044	-0.650		-122.613		-122.613
26	0.686	0.033			-0.652	-0.055		-122.668		-122.668
27	0.033	0.002			-0.032	-0.002		-122.670		-122.670
28	0.002	0.000			-0.001	-0.000		-122.670		-122.670
29	0.000	0.000			-0.000	-0.000		-122.670		-122.670
30	0.000	0.000			-0.000	-0.000		-122.670		-122.670
31	0.000	0.000			-0.000	-0.000		-122.670		-122.670
32	0.000	0.000			-0.000	-0.000		-122.670		-122.670
33	0.000	0.000			-0.000	-0.000		-122.670		-122.670
TOTALS	636.199	391.462			-244.738	-122.670		-122.670		-122.670

ALL VALUES IN MILLIONS OF DOLLARS





SUMMARY OF  
PESSIM 4 OVER PESSIM 3

>>>>>>> PRESENT VALUES <<<<<<<<<<

THE PRESENT VALUE OF THE BENEFITS OF SELECTING PESSIM 4 OVER PESSIM 3 DISCOUNTED AT 10.0 PERCENT INTEREST IS  
-74.118 MILLIONS OF DOLLARS AND WILL ACCRUE OVER 33 YEARS.

THE PRESENT VALUE OF THE DIFFERENCE IN COSTS OF SELECTING PESSIM 4 OVER PESSIM 3 WHEN DISCOUNTED AT 10.0  
PERCENT INTEREST IS -122.670 MILLIONS OF DOLLARS AND WILL ACCRUE OVER 33 YEARS.

THE PRESENT VALUE OF THE BENEFIT/COST RATIO OF PESSIM 4 OVER PESSIM 3 IS 1:1 WHEN DISCOUNTED AT 10.0  
PERCENT INTEREST.

THE PRESENT VALUE OF THE NET BENEFITS OF SELECTING PESSIM 4 OVER PESSIM 3 IS 48.552 MILLIONS OF DOLLARS  
WHEN DISCOUNTED AT 10.0 PERCENT INTEREST.

>>>>>>> UNDISCOUNTED VALUES <<<<<<<<<<

THE SUM OF THE UNDISCOUNTED BENEFITS OF SELECTING PESSIM 4 OVER PESSIM 3 IS -255.918 MILLIONS OF DOLLARS  
WHEN ACCRUED OVER 33 YEARS, AND MAY CONTINUE TO ACCRUE AT -0.000 MILLIONS OF DOLLARS PER ANNUM FOREVER.

THE UNDISCOUNTED COST OF EXECUTING PESSIM 4 IS 391.462 MILLIONS OF DOLLARS WHEN SUMMED OVER 33 YEARS  
AND MAY CONTINUE TO ACCRUE AT 0.000 MILLIONS OF DOLLARS PER ANNUM FOREVER.

THE UNDISCOUNTED COST OF EXECUTING PESSIM 3 IS 636.199 MILLIONS OF DOLLARS WHEN SUMMED OVER 33 YEARS  
AND MAY CONTINUE TO ACCRUE AT 0.000 MILLIONS OF DOLLARS PER ANNUM FOREVER.

THE UNDISCOUNTED DIFFERENCE IN COST OF SELECTING PESSIM 4 OVER PESSIM 3 IS -244.738 MILLIONS OF DOLLARS  
WHEN SUMMED OVER 33 YEARS.

THE UNDISCOUNTED NET BENEFITS OF SELECTING PESSIM 4 OVER PESSIM 3 IS -11.180 MILLIONS OF DOLLARS  
WHEN SUMMED OVER 33 AND 33 YEARS RESPECTFULLY.

THE UNDISCOUNTED BENEFIT/COST RATIO OF SELECTING PESSIM 4 OVER PESSIM 3 IS 1:1 WHEN SUMMED OVER 33  
AND 33 YEARS RESPECTFULLY.



PESSIM 3 MEXICO BARRIER ZONE IN TEHUANTEPEC MARCH 1976

PESSIMISTIC

OPTION 3 ASSUMES THAT A BARRIER ZONE WILL BE ERCTED AT THE ISTHMUS OF TEHUANTEPEC, MEXICO, TO PREVENT OR GREATLY RETARD THE NORTHWARD SPREAD OF THE MEDITERRANEAN FRUIT FLY. THE BARRIER ZONE WOULD MEASURE 60-MILES-DEEP AND 80-MILES-ACROSS. THE MEDITERRANEAN FRUIT FLY POPULATION IN THE BARRIER ZONE WOULD BE MAINTAINED AT NEAR ZERO LEVEL THROUGH THE USE OF TRAPS, ULV MALATHION, TOXIC BAITS, CULTURAL PRACTICES AND QUARANTINE MEASURES. SUCH A BARRIER ZONE, IT WAS ASSUMED, WOULD PREVENT SPREAD FOR EIGHT YEARS, AFTER WHICH THE BARRIER ZONE WOULD BE MOVED SLOWLY AHEAD OF SPREAD. INFESTATIONS ABOVE THE BARRIER ZONE WOULD BE ERADICATED THROUGH THE USE OF ULV MALATHION, TOXIC BAITS, AND STERILE MALE RELEASES. THE COST OF CONDUCTING SUCH A PROGRAM INCLUDES THE ERADICATION OF ISOLATED INFESTATIONS ABOVE THE BARRIER ZONE. THE COST OF MAINTAINING A BARRIER ZONE WAS ESTIMATED FROM A 1971 STUDY BY ECONOMIC RESEARCH SERVICE, USDA. IN ADDITION, IT WAS ASSUMED THAT AN AVERAGE OF 4 ISOLATED INFESTATIONS ABOVE THE BARRIER ZONE WOULD OCCUR EACH YEAR. THE COST OF ERADICATING THESE INFESTATIONS ADDED AN AVERAGE OF \$4.876/ACRE TO POTENTIAL COST(PC). THIS OPTION ALSO INCLUDES THE COST OF ERADICATING THE 1975-1976 INFESTATION IN LOS ANGELES COUNTY, CALIFORNIA.

PESSIM 2 GUATEMALA - BARRIER ZONE IN GUATEMALA MARCH 1976

PESSIMISTIC

OPTION 2 ASSUMES THAT A BARRIER ZONE WILL BE ERCTED IN GUATEMALA TO PREVENT OR GREATLY RETARD THE NORTHWARD SPREAD OF THE MEDITERRANEAN FRUIT FLY TO BELIZE AND MEXICO. THE BARRIER ZONE WOULD ESSENTIALLY ERADICATE THE MEDITERRANEAN FRUIT FLY FROM A ZONE 60 MILES DEEP, USING AN INTEGRATION OF TOXIC BAITS, ULV MALATHION, TRAPS BAITED WITH LURES, CULTURAL PRACTICES, STERILE MALE RELEASES, AND QUARANTINE MEASURES. BREACHING OF THE GUATEMALA BARRIER WOULD BE FOLLOWED BY A BARRIER ZONE IN THE ISTHMUS OF TEHUANTEPEC. BREACHING OF THE BARRIER ZONE AT TEHUANTEPEC WOULD BE FOLLOWED BY A GRADUAL SHIFTING OF A BARRIER ZONE AS THE INFESTATION SLOWLY MOVED NORTHWARD AND FINALLY INFESTED ALL OF ITS ECOLOGICAL RANGE IN NORTH AMERICA. THE COST OF MAINTAINING A BARRIER ZONE WAS ESTIMATED FROM A 1971 STUDY BY ECONOMIC RESEARCH SERVICE. IN ADDITION, IT WAS ASSUMED THAT AN AVERAGE OF 4 ISOLATED INFESTATIONS ABOVE THE BARRIER ZONE WOULD OCCUR EACH YEAR. THE COST OF ERADICATING THESE INFESTATIONS ADDED AN AVERAGE OF \$4.876/ACRE TO POTENTIAL COSTS (PC). THIS OPTION ALSO INCLUDES THE COST OF ERADICATING THE 1975 INFESTATION IN LOS ANGELES COUNTY, CALIFORNIA. THE TOTAL COST OF ERADICATING THIS INFESTATION WAS ESTIMATED AT \$931,000 DURING 1976 WITH AN ADDITIONAL \$3,000 BEING SPENT IN 1977 AND \$1,000 IN 1978 FOR SURVEY AND FOLLOWUP WORK.



MEDITERRANEAN FRUIT FLY - PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

CROP-AREA	YEARS TILL ARRIVAL OF PEST		YEARS SPREAD OF PEST	TILL T2	POTENTIAL LOSSES MILLIONS OF DOLLARS PL	YEARS IN AREA K	POTENTIAL COST		ACRES OF HOST CROP
	T1	T2					DOLLARS PER ACRE PC		
GUATEMALA	PESSIM 3	-2	2		8.121	0	0.0		23500.
	PESSIM 2	-2	5		8.121	4	35.229		23500.
SOTHERN MEXICO	PESSIM 3	2	4		23.986	0	0.0		694698.
	PESSIM 2	5	14		23.986	5	35.229		694698.
NORTHERN MEXICO	PESSIM 3	5	13		48.044	5	35.229		1389418.
	PESSIM 2	14	22		48.044	5	35.229		1389418.
TEXAS	PESSIM 3	13	19		13.574	5	41.443		162900.
	PESSIM 2	16	28		13.574	5	41.443		162900.
ARIZONA	PESSIM 3	19	23		21.101	4	41.443		57700.
	PESSIM 2	24	28		21.101	4	41.443		57700.
FLORIDA	PESSIM 3	7	16		22.296	6	41.443		937065.
	PESSIM 2	8	18		22.296	6	41.443		937065.
GEORGIA	PESSIM 3	12	17		3.285	2	41.443		181100.
	PESSIM 2	14	18		3.285	2	41.443		181100.
ALABAMA	PESSIM 3	11	14		0.465	2	41.443		24400.
	PESSIM 2	17	21		0.465	2	41.443		24400.
S. CAROLINA	PESSIM 3	13	18		0.612	2	41.443		44300.
	PESSIM 2	20	25		0.612	2	41.443		44300.
LOUISIANA	PESSIM 3	12	15		0.208	1	41.443		10500.
	PESSIM 2	12	15		0.208	1	41.443		10500.
MISSISSIPPI	PESSIM 3	13	16		0.797	1	41.443		7540.
	PESSIM 2	13	16		0.797	1	41.443		7540.
CALIFORNIA	PESSIM 3	22	28		144.000	6	41.443		373000.
	PESSIM 2	26	32		144.000	6	41.443		373000.
TOTALS OR AVERAGES				MIN		MAX			
PESSIM 3				-2	286.489	6	31.613		3906121.
PESSIM 2				-2	286.489	6	38.090		3906121.



MEDITERRANEAN FRUIT FLY - PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

YEAR	LOSSES PESSIM 3	LOSSES PESSIM 2	BENEFITS OF PESSIM 2	DISCOUNTED BENEFITS	ACCUMULATED DISCOUNTED BENEFITS
1	8.041	1.718	6.323	5.748	5.748
2	8.123	6.403	1.719	1.421	7.169
3	20.114	7.967	12.147	9.126	16.295
4	32.105	8.110	23.995	16.389	32.684
5	32.112	8.123	23.989	14.895	47.580
6	32.155	8.140	24.016	13.556	61.136
7	32.585	8.264	24.321	12.480	73.616
8	36.491	9.187	27.304	12.738	86.354
9	56.262	14.476	41.786	17.721	104.075
10	76.773	25.854	50.918	19.631	123.707
11	85.570	31.589	53.980	18.920	142.626
12	96.526	35.014	61.512	19.600	162.226
13	101.921	43.246	58.675	16.996	179.222
14	103.494	51.590	51.904	13.668	192.890
15	107.386	54.907	52.479	12.563	205.453
16	114.502	57.439	57.063	12.419	217.872
17	120.783	63.020	57.763	11.428	229.300
18	121.359	82.746	38.613	6.945	236.245
19	121.389	102.736	18.652	3.050	239.295
20	121.597	107.324	14.273	2.122	241.417
21	131.939	109.562	22.377	3.024	244.440
22	142.295	114.068	28.227	3.468	247.908
23	142.796	118.898	23.898	2.669	250.577
24	148.875	120.786	28.090	2.852	253.429
25	214.489	121.463	93.026	8.586	262.015
26	280.103	131.924	148.179	12.433	274.448
27	286.180	142.583	143.596	10.953	285.401
28	286.475	148.872	137.603	9.542	294.943
29	286.488	214.489	72.000	4.539	299.482
30	286.489	280.102	6.387	0.366	299.848
31	286.489	286.180	0.309	0.016	299.864
32	286.489	286.475	0.014	0.001	299.865
33	286.489	286.488	0.001	0.000	299.865
34	286.489	286.489	0.000	0.000	299.865
35	286.489	286.489	0.000	0.000	299.865
36	286.489	286.489	0.000	0.000	299.865
37	286.489	286.489	0.000	0.000	299.865
TOTALS	5640.837	4235.700	1405.138	299.865	299.865







MEDITERRANEAN FRUIT FLY - PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

PRESENT FUNDING, DOLLARS  
 PESSIM 3 0.  
 PESSIM 2 0.

ANTICIPATED CONTINGENCY MONEY, DOLLARS  
 YEAR 1 2 3 4 5 6 7 8  
 PESSIM 3 931000. 3000. 1000. 0. 0. 0. 0. 0.  
 PESSIM 2 931000. 3000. 1000. 0. 0. 0. 0. 0.



MEDITERRANEAN FRUIT FLY - PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

	COST		COST DIFFERENCE		ADDITIONAL COST		CUMULATIVE COST	
	PESSIM 3	PESSIM 2	PESSIM 2 - 3		DISCOUNTED		DISCOUNTED	
1	0.984	1.603	0.619	ALL VALUES IN MILLIONS OF DOLLARS				
2	0.518	0.328	-0.190		0.563		0.563	
3	4.682	1.127	-3.555		-0.157		0.406	
4	26.196	6.625	-19.571		-2.671		-2.265	
5	54.760	18.953	-35.807		-13.367		-15.632	
6	76.982	28.682	-48.301		-22.234		-37.866	
7	85.523	43.599	-41.924		-27.265		-65.130	
8	83.068	56.888	-26.180		-21.514		-86.644	
9	63.061	55.865	-7.196		-12.213		-98.857	
10	41.903	45.045	3.143		-3.052		-101.909	
11	33.424	39.430	6.005		1.212		-100.697	
12	18.786	38.137	19.351		2.105		-98.593	
13	15.618	44.408	28.790		6.166		-92.427	
14	15.298	53.931	38.633		8.340		-84.087	
15	9.099	57.036	47.937		10.173		-73.914	
16	3.685	53.526	49.841		11.476		-62.438	
17	1.537	48.470	46.933		10.847		-51.591	
18	3.068	31.009	27.941		9.286		-42.306	
19	10.121	11.348	1.227		5.026		-37.280	
20	17.140	7.132	-10.008		0.201		-37.079	
21	16.621	7.223	-9.397		-1.488		-38.567	
22	15.479	6.836	-8.643		-1.270		-39.837	
23	15.425	11.544	-3.881		-1.062		-40.899	
24	14.773	17.470	2.697		-0.433		-41.332	
25	7.729	17.860	10.130		0.274		-41.058	
26	0.686	16.665	15.980		0.935		-40.123	
27	0.033	15.452	15.419		1.341		-38.782	
28	0.002	14.774	14.772		1.176		-37.606	
29	0.000	7.729	7.729		1.024		-36.582	
30	0.000	0.686	0.686		0.487		-36.095	
31	0.000	0.033	0.033		0.039		-36.055	
32	0.000	0.002	0.002		0.002		-36.054	
33	0.000	0.000	0.000		0.000		-36.054	
34	0.000	0.000	0.000		0.000		-36.054	
35	0.000	0.000	0.000		0.000		-36.054	
36	0.000	0.000	0.000		0.000		-36.054	
37	0.0	0.000	0.000		0.000		-36.054	
TOTALS	636.199	759.415	123.215		-36.054		-36.054	



SUMMARY OF  
PESSIM 2 OVER PESSIM 3

>>>>>>>> PRESENT VALUES <<<<<<<<<<<<

THE PRESENT VALUE OF THE BENEFITS OF SELECTING PESSIM 2 OVER PESSIM 3 DISCOUNTED AT 10.0 PERCENT INTEREST IS 299.865 MILLIONS OF DOLLARS AND WILL ACCRUE OVER 37 YEARS.

THE PRESENT VALUE OF THE DIFFERENCE IN COSTS OF SELECTING PESSIM 2 OVER PESSIM 3 WHEN DISCOUNTED AT 10.0 PERCENT INTEREST IS -36.054 MILLIONS OF DOLLARS AND WILL ACCRUE OVER 37 YEARS.

THE PRESENT VALUE OF THE BENEFIT/COST RATIO OF PESSIM 2 OVER PESSIM 3 IS -8:1 WHEN DISCOUNTED AT 10.0 PERCENT INTEREST.

THE PRESENT VALUE OF THE NET BENEFITS OF SELECTING PESSIM 2 OVER PESSIM 3 IS 335.918 MILLIONS OF DOLLARS WHEN DISCOUNTED AT 10.0 PERCENT INTEREST.

>>>>>>>> UNDISCOUNTED VALUES <<<<<<<<<<<<

THE SUM OF THE UNDISCOUNTED BENEFITS OF SELECTING PESSIM 2 OVER PESSIM 3 IS 1405.138 MILLIONS OF DOLLARS WHEN ACCRUED OVER 37 YEARS, AND MAY CONTINUE TO ACCRUE AT 0.000 MILLIONS OF DOLLARS PER ANNUM FOREVER.

THE UNDISCOUNTED COST OF EXECUTING PESSIM 2 IS 759.415 MILLIONS OF DOLLARS WHEN SUMMED OVER 37 YEARS AND MAY CONTINUE TO ACCRUE AT 0.000 MILLIONS OF DOLLARS PER ANNUM FOREVER.

THE UNDISCOUNTED COST OF EXECUTING PESSIM 3 IS 636.199 MILLIONS OF DOLLARS WHEN SUMMED OVER 37 YEARS AND MAY CONTINUE TO ACCRUE AT 0.0 MILLIONS OF DOLLARS PER ANNUM FOREVER.

THE UNDISCOUNTED DIFFERENCE IN COST OF SELECTING PESSIM 2 OVER PESSIM 3 IS 123.215 MILLIONS OF DOLLARS WHEN SUMMED OVER 37 YEARS.

THE UNDISCOUNTED NET BENEFITS OF SELECTING PESSIM 2 OVER PESSIM 3 IS 12B1.922 MILLIONS OF DOLLARS WHEN SUMMED OVER 37 AND 37 YEARS RESPECTFULLY.

THE UNDISCOUNTED BENEFIT/COST RATIO OF SELECTING PESSIM 2 OVER PESSIM 3 IS 11:1 WHEN SUMMED OVER 37 AND 37 YEARS RESPECTFULLY.



PESSIM 4 TEXAS-MEXICO BARRIER ZONE - ALONG RIO GRANDE RIVER MARCH 1976

PESSIMISTIC

OPTION 4 ASSUMES THAT NO EFFORT WILL BE MADE TO RETARD SPREAD OF THE MEDITERRANEAN FRUIT FLY BEFORE IT REACHES THE TEXAS-MEXICO BORDER. THE SCENARIO IS SIMILAR TO THAT FOLLOWED FOR CITRUS BLACKFLY--WHERE A BARRIER ZONE WAS MAINTAINED SOUTH OF THE RIO GRANDE RIVER FOR MANY YEARS. THE PER ACRE COST OF MAINTAINING A BARRIER ZONE WAS ASSUMED TO BE CONSTANT EXCEPT FOR GUATEMALA AND MEXICO. WHERE BECAUSE OF LOWER LABOR COSTS PC AS REDUCED 15 PERCENT. PROGRAM COSTS AND LOSSES TO THE MEDITERRANEAN FRUIT FLY ARE EXPEDIENT ESTIMATES TO PERMIT A FIRST APPROXIMATION OF THE BENEFITS AND COSTS OF A PROGRAM TO RETARD THE NORTHWARD SPREAD THROUGH MEXICO AND INTO THE UNITED STATES. THE SAME ASSUMPTIONS WERE MADE IN PREPARING OPTION 4 AS WERE MADE FOR OPTIONS 2 AND 3 -- THE ONLY DIFFERENCES BEING THAT NO EFFORT TO RETARD SPREAD BELOW THE TEXAS-MEXICO BORDER WOULD BE MADE. AN IMPORTANT ASSUMPTION FOR ALL THESE OPTIONS IS THAT EACH STATE, AS WELL AS GUATEMALA AND MEXICO, WOULD CONDUCT A PROGRAM TO PROTECT THEIR COUNTRIES HOST CROPS.

PESSIM 2 GUATEMALA - BARRIER ZONE IN GUATEMALA MARCH 1976

PESSIMISTIC

OPTION 2 ASSUMES THAT A BARRIER ZONE WILL BE ERECTED IN GUATEMALA TO PREVENT OR GREATLY RETARD THE NORTHWARD SPREAD OF THE MEDITERRANEAN FRUIT FLY TO BELIZE AND MEXICO. THE BARRIER ZONE WOULD ESSENTIALLY ERADICATE THE MEDITERRANEAN FRUIT FLY FROM A ZONE 60 MILES DEEP. USING AN INTEGRATION OF TOXIC BAITS, ULV MALATHION, TRAPS BAITED WITH LURES, CULTURAL PRACTICES, STERILE MALE RELEASES, AND QUARANTINE MEASURES. BREACHING OF THE GUATEMALA BARRIER WOULD BE FOLLOWED BY A BARRIER ZONE IN THE ISTHMX OF TEHUANTEPEC. BREACHING OF THE BARRIER ZONE AT TEHUANTEPEC WOULD BE FOLLOWED BY A GRADUAL SHIFTING OF A BARRIER ZONE AS THE INFESTATION SLOWLY MOVED NORTHWARD AND FINALLY INFESTED ALL OF ITS ECOLOGICAL RANGE IN NORTH AMERICA. THE COST OF MAINTAINING A BARRIER ZONE WAS ESTIMATED FROM A 1971 STUDY BY ECONOMIC RESEARCH SERVICE. IN ADDITION, IT WAS ASSUMED THAT AN AVERAGE OF 4 ISOLATED INFESTATIONS ABOVE THE BARRIER ZONE WOULD OCCUR EACH YEAR. THE COST OF ERADICATING THESE INFESTATIONS ADDED AN AVERAGE OF \$4.876/ACRE TO POTENTIAL COSTS (PC). THIS OPTION ALSO INCLUDES THE COST OF ERADICATING THE 1975 INFESTATION IN LOS ANGELES COUNTY, CALIFORNIA. THE TOTAL COST OF ERADICATING THIS INFESTATION WAS ESTIMATED AT \$931,000 DURING 1976 WITH AN ADDITIONAL \$3,000 BEING SPENT IN 1977 AND \$1,000 IN 1978 FOR SURVEY AND FOLLOWUP WORK.





## MEDITERRANEAN FRUIT FLY - PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

CROP-AREA	YEARS TILL		YEARS TILL SPREAD OF PEST T2	POTENTIAL LOSSES MILLIONS OF DOLLARS PL	YEARS IN AREA K	POTENTIAL COST		ACRES OF HOST CROP
	ARRIVAL OF PEST T1	OF PEST T2				DOLLARS PER ACRE PC		
GUATEMALA								
PESSIM 4	-2	2	8.121	0	0	0.0		23500.
PESSIM 2	-2	5	8.121	4		35.229		23500.
SOTHERN MEXICO								
PESSIM 4	2	4	23.986	0	0	0.0		694698.
PESSIM 2	5	14	23.986	5		35.229		694698.
NORTHERN MEXICO								
PESSIM 4	4	9	48.044	0	0	0.0		1389418.
PESSIM 2	14	22	48.044	5		35.229		1389418.
TEXAS								
PESSIM 4	16	22	13.574	5		41.443		162900.
PESSIM 2	16	28	13.574	5		41.443		162900.
ARIZONA								
PESSIM 4	19	23	21.101	4		41.443		57700.
PESSIM 2	24	28	21.101	4		41.443		57700.
FLORIDA								
PESSIM 4	6	15	22.296	6		41.443		937065.
PESSIM 2	8	18	22.296	6		41.443		937065.
GEORGIA								
PESSIM 4	11	13	3.285	2		41.443		181100.
PESSIM 2	14	18	3.285	2		41.443		181100.
ALABAMA								
PESSIM 4	11	14	0.465	2		41.443		24400.
PESSIM 2	17	21	0.465	2		41.443		24400.
S. CAROLINA								
PESSIM 4	11	16	0.612	2		41.443		44300.
PESSIM 2	20	25	0.612	2		41.443		44300.
LOUISIANA								
PESSIM 4	11	16	0.208	1		41.443		10500.
PESSIM 2	12	15	0.208	1		41.443		10500.
MISSISSIPPI								
PESSIM 4	12	15	0.797	1		41.443		7540.
PESSIM 2	13	16	0.797	1		41.443		7540.
CALIFORNIA								
PESSIM 4	21	27	144.000	6		41.443		373000.
PESSIM 2	26	32	144.000	6		41.443		373000.
TOTALS OR AVERAGES								
	MIN	MAX		MAX				
PESSIM 4	-2	27	286.489	6		19.082		3906121.
PESSIM 2	-2	32	286.489	6		38.090		3906121.



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MEDITERRANEAN FRUIT FLY - PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976  
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ACCUMULATED DISCOUNTED  
BENEFITS

DISCOUNTED  
BENEFITS

BENEFITS  
OF PESSIM 2

LOSSES  
PESSIM 2

LOSSES  
PESSIM 4

YEAR

ALL VALUES IN MILLIONS OF DOLLARS

1	8.041	1.718	6.323	5.748	5.748	5.748
2	8.123	6.403	1.719	1.421	7.169	7.169
3	20.114	7.967	12.147	9.126	16.295	16.295
4	32.109	8.110	23.999	16.392	32.687	32.687
5	32.298	8.123	24.175	15.011	47.698	47.698
6	38.681	8.140	30.542	17.240	64.938	64.938
7	73.596	8.264	65.332	33.526	98.464	98.464
8	80.093	9.187	70.906	33.078	131.542	131.542
9	81.135	14.476	66.659	28.270	159.812	159.812
10	86.045	25.854	60.191	23.206	183.019	183.019
11	96.553	31.589	64.964	22.770	205.788	205.788
12	103.125	35.014	68.110	21.702	227.490	227.490
13	106.191	43.246	62.944	18.233	245.723	245.723
14	107.649	51.590	56.059	14.762	260.485	260.485
15	107.809	54.907	52.902	12.664	273.150	273.150
16	107.815	57.439	50.376	10.963	284.113	284.113
17	107.843	63.020	44.823	8.868	292.981	292.981
18	108.416	82.746	25.670	4.617	297.598	297.598
19	114.603	102.736	11.867	1.940	299.539	299.539
20	120.996	107.324	13.672	2.032	301.571	301.571
21	131.924	109.562	22.361	3.022	304.593	304.593
22	142.588	114.068	28.520	3.504	308.096	308.096
23	148.873	118.898	29.975	3.348	311.444	311.444
24	214.489	120.786	93.703	9.513	320.957	320.957
25	280.103	121.463	158.639	14.642	335.599	335.599
26	286.180	131.924	154.256	12.943	348.542	348.542
27	286.475	142.583	143.891	10.976	359.518	359.518
28	286.488	148.872	137.616	9.543	369.061	369.061
29	286.489	214.489	72.000	4.539	373.600	373.600
30	286.489	280.102	6.387	0.366	373.966	373.966
31	286.489	286.180	0.309	0.016	373.982	373.982
32	286.489	286.475	0.014	0.001	373.983	373.983
33	286.489	286.488	0.001	0.000	373.983	373.983
34	286.489	286.489	0.000	0.000	373.983	373.983
35	286.489	286.489	0.000	0.000	373.983	373.983
36	286.489	286.489	0.000	0.000	373.983	373.983
37	286.489	286.489	0.000	0.000	373.983	373.983
TOTALS	5896.755	4235.700	1661.055	373.983	373.983	373.983



MEDITERRANEAN FRUIT FLY - PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

PRESENT FUNDING, DOLLARS  
 PESSIM 4 0.  
 PESSIM 2 0.

ANTICIPATED CONTINGENCY MONEY, DOLLARS  
 YEAR 1 2 3  
 PESSIM 4 931000. 3000. 1000.  
 PESSIM 2 931000. 3000. 1000.

4 5 6 7 8  
 0. 0. 0. 0. 0.  
 0. 0. 0. 0. 0.



MEDITERRANEAN FRUIT FLY - PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

	COST		COST PESSIM 2	COST DIFFERENCE PESSIM 2 - 4	ADDITIONAL COST		CUMULATIVE COST DISCOUNTED
	PESSIM 4	PESSIM 2			DISCOUNTED	DISCOUNTED	
ALL VALUES IN MILLIONS OF DOLLARS							
1	0.961	1.603		0.642	0.584		0.584
2	0.234	0.328		0.093	0.077		0.661
3	1.723	1.127		-0.597	-0.448		0.213
4	10.266	6.625		-3.642	-2.487		-2.275
5	28.568	18.953		-9.615	-5.970		-8.245
6	37.109	28.682		-8.427	-4.757		-13.002
7	38.573	43.599		5.025	2.579		-10.423
8	38.573	56.888		18.315	8.544		-1.879
9	37.110	55.865		18.755	7.954		6.075
10	32.373	45.045		12.673	4.886		10.961
11	18.990	39.430		20.440	7.164		18.125
12	8.105	38.137		30.032	9.569		27.694
13	2.755	44.408		41.654	12.066		39.760
14	3.728	53.931		50.203	13.220		52.980
15	6.466	57.036		50.570	12.106		65.086
16	6.794	53.526		46.733	10.170		75.257
17	8.617	48.470		39.853	7.885		83.141
18	16.548	31.009		14.461	2.601		85.742
19	20.539	11.348		-9.191	-1.503		84.239
20	18.092	7.132		-10.960	-1.629		82.610
21	16.665	7.223		-9.442	-1.276		81.334
22	15.449	6.836		-8.613	-1.058		80.276
23	14.773	11.544		-3.229	-0.361		79.916
24	7.729	17.470		9.741	0.989		80.905
25	0.686	17.860		17.174	1.585		82.490
26	0.933	16.665		16.632	1.396		83.885
27	0.002	15.452		15.450	1.179		85.064
28	0.000	14.774		14.773	1.024		86.088
29	0.000	7.729		7.729	0.487		86.576
30	0.000	0.686		0.686	0.039		86.615
31	0.000	0.033		0.033	0.002		86.617
32	0.000	0.002		0.002	0.000		86.617
33	0.000	0.000		0.000	0.000		86.617
34	0.000	0.000		0.000	0.000		86.617
35	0.000	0.000		0.000	0.000		86.617
36	0.0	0.000		0.000	0.000		86.617
37	0.0	0.000		0.000	0.000		86.617
TOTALS	391.462	759.415		367.953	86.617		86.617

ALL VALUES IN MILLIONS OF DOLLARS





BENEFIT/COST ANALYSIS  
PLANT PROTECTION PROGRAMS USDA APHIS

## SUMMARY OF

>>>>>>> PRESENT VALUES <<<<<<<<

THE PRESENT VALUE OF THE BENEFITS OF SELECTING PESSIM 2 OVER PESSIM 4 DISCOUNTED AT 10.0 PERCENT INTEREST IS 373.983 MILLIONS OF DOLLARS AND WILL ACCRUE OVER 37 YEARS.

THE PRESENT VALUE OF THE DIFFERENCE IN COSTS OF SELECTING PESSIM 2 OVER PESSIM 4 WHEN DISCOUNTED AT 10.0 PERCENT INTEREST IS 86.617 MILLIONS OF DOLLARS AND WILL ACCRUE OVER 37 YEARS.

THE PRESENT VALUE OF THE BENEFIT/COST RATIO OF PESSIM 2 OVER PESSIM 4 IS 4:1 WHEN DISCOUNTED AT 10.0 PERCENT INTEREST.

THE PRESENT VALUE OF THE NET BENEFITS OF SELECTING PESSIM 2 OVER PESSIM 4 IS 287.366 MILLIONS OF DOLLARS WHEN DISCOUNTED AT 10.0 PERCENT INTEREST.

>>>>>> UNDISCOUNTED VALUES <<<<<<<

THE SUM OF THE UNDISCOUNTED BENEFITS OF SELECTING PESSIM 2 OVER PESSIM 4 IS 1661,055 MILLIONS OF DOLLARS WHEN ACCRUED OVER 37 YEARS, AND MAY CONTINUE TO ACCRUE AT 0,000 MILLIONS OF DOLLARS PER ANNUM FOREVER.

THE UNDISCOUNTED COST OF EXECUTING PESSIM 2 IS 759.415 MILLIONS OF DOLLARS WHEN SUMMED OVER 37 YEARS AND MAY CONTINUE TO ACCRUE AT 0.000 MILLIONS OF DOLLARS PER ANNUM FOREVER.

THE UNDISCOUNTED COST OF EXECUTING PESSIM 4 IS 391.462 MILLIONS OF DOLLARS WHEN SUMMED OVER 37 YEARS AND MAY CONTINUE TO ACCRUE AT 0.0 MILLIONS OF DOLLARS PER ANNUM FOREVER.

THE UNDISCOUNTED DIFFERENCE IN COST OF SELECTING PESSIM 2 OVER PESSIM 4 IS 367.953 MILLIONS OF DOLLARS WHEN SUMMED OVER 37 YEARS.

THE UNDISCOUNTED NET BENEFITS OF SELECTING PESSIM 2 OVER PESSIM 4 IS 1293.102 MILLIONS OF DOLLARS WHEN SUMMED OVER 37 AND 37 YEARS RESPECTFULLY.

THE UNDISCOUNTED BENEFIT/COST RATIO OF SELECTING PESSIM 2 OVER PESSIM 4 IS 5:1 WHEN SUMMED OVER 37 AND 37 YEARS RESPECTFULLY.

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PESSIM 1 DO NOTHING - ERADICATION OF 1975 CALIF. INFESTATION SUCCESSFUL.

**PESSIMISTIC**

OPTION 1 ASSUMES THAT NEITHER GOVERNMENTS OF GUATEMALA, MEXICO, NOR THE UNITED STATES WILL CONDUCT A PROGRAM TO RETARD THE SPREAD OF THE MEDITERRANEAN FRUIT FLY FROM CENTRAL AMERICA TO THE SUSCEPTIBLE AREAS IN NORTH AMERICA AND MEXICO. A FURTHER ASSUMPTION IS THAT THE PRODUCERS OF THE HOST CROPS WILL EMPLOY EXISTING PEST CONTROL TECHNOLOGY SIMILAR TO THAT IN USE IN THE MEDITERRANEAN COUNTRIES, TO COMBAT THIS PEST. UNREALIZED YIELDS WILL, THEREFORE, BE HELD TO A LEVEL COMMENSURATE WITH THE PRODUCER'S PERCEIVED BENEFITS FROM SUCH CONTROL MEASURES. THE POTENTIAL LOSSES GIVEN BELOW INCLUDE THE VALUE OF UNREALIZED YIELDS PLUS THE COST OF CONTROL INCURRED BY THE FARMER IN PROTECTING HIS CROPS. THE VALUES USED AS INPUTS TO THIS BENEFIT/COST ANALYSIS ARE CRUDE ESTIMATES AND REPRESENT EXPEDIENT ESTIMATES TO PERMIT MAKING A FIRST APPROXIMATION OF THE BENEFITS AND COSTS OF CONDUCTING A MEDITERRANEAN FRUIT FLY PROGRAM IN EITHER MEXICO OR GUATEMALA. THE 'DO NOTHING' OPTION IS INCLUDED TO FORM A BASIS FOR ESTIMATING THE BENEFITS AND COSTS OF THE OTHER OPTIONS. IT WAS ASSUMED THAT EACH ACRE OF HOST CROP WOULD RECEIVE 4 INSECTICIDE APPLICATIONS AT \$3.50/ACRE/ APPLICATION EXCEPT FOR MEXICO AND GUATEMALA WHERE ONLY 2 APPLICATIONS WERE ASSUMED. OWING TO THE LOWER TECHNOLOGICAL AGRICULTURE BASE. IT WAS FURTHER ASSUMED THAT THE INFESTATION IN CALIFORNIA WOULD BE ERADICATED AT A COST OF \$935000 OVER THE NEXT THREE YEARS.

## PESSIM 3 MEXICO BARRIER ZONE IN TEHAUANTEPEC MARCH 1976

## Pessimistic

OPTION 3 ASSUMES THAT A BARRIER ZONE WILL BE ERRECTED AT THE ISTHMUS OF TEHUANTEPEC, MEXICO, TO PREVENT OR GREATLY RETARD THE NORTHWARD SPREAD OF THE MEDITERRANEAN FRUIT FLY. THE BARRIER ZONE WOULD MEASURE 60-MILES-DEEP AND 80-MILES-ACROSS. THE MEDITERRANEAN FRUIT FLY POPULATION IN THE BARRIER ZONE WOULD BE MAINTAINED AT NEAR ZERO LEVEL THROUGH THE USE OF TRAPS, ULV MALATHION, TOXIC BAITS, CULTURAL PRACTICES AND QUARANTINE MEASURES, SUCH A BARRIER ZONE, IT WAS ASSUMED, WOULD PREVENT SPREAD FOR EIGHT YEARS, AFTER WHICH THE BARRIER ZONE WOULD BE MOVED SLOWLY AHEAD OF SPREAD. INFESTATIONS ABOVE THE BARRIER ZONE WOULD BE ERADICATED THROUGH THE USE OF ULV MALATHION, TOXIC BAITS, AND STERILE MALE RELEASES. THE COST OF CONDUCTING SUCH A PROGRAM INCLUDES THE ERADICATION OF ISOLATED INFESTATIONS ABOVE THE BARRIER ZONE. THE COST OF MAINTAINING A BARRIER ZONE WAS ESTIMATED FROM A 1971 STUDY BY ECONOMIC RESEARCH SERVICE, USDA. IN ADDITION, IT WAS ASSUMED THAT AN AVERAGE OF 4 ISOLATED INFESTATIONS ABOVE THE BARRIER ZONE WOULD OCCUR EACH YEAR. THE COST OF ERADICATING THESE INFESTATIONS ADDED AN AVERAGE OF \$.876/ACRE TO POTENTIAL COST(PC). THIS OPTION ALSO INCLUDES THE COST OF ERADICATING THE 1975-1976 INFESTATION IN LOS ANGELES COUNTY, CALIFORNIA.

PESSIM 4 TEXAS-MEXICO BARRIER ZONE - ALONG RIO GRANDE RIVER MARCH 1976

## Pessimistic

OPTION 4 ASSUMES THAT NO EFFORT WILL BE MADE TO RETARD SPREAD OF THE MEDITERRANEAN FRUIT FLY BEFORE IT REACHES THE TEXAS-MEXICO BORDER. THE SCENARIO



IS SIMILAR TO THAT FOLLOWED FOR CITRUS BLACKFLY--WHERE A BARRIER ZONE WAS MAINTAINED SOUTH OF THE RIO GRANDE RIVER FOR MANY YEARS. THE PER ACRE COST OF MAINTAINING A BARRIER ZONE WAS ASSUMED TO BE CONSTANT EXCEPT FOR GUATEMALA AND MEXICO. WHERE BECAUSE OF LOWER LABOR COSTS PC AS REDUCED 15 PERCENT. PROGRAM COSTS AND LOSSES TO THE MEDITERRANEAN FRUIT FLY ARE EXPEDIENT ESTIMATES TO PERMIT A FIRST APPROXIMATION OF THE BENEFITS AND COSTS OF A PROGRAM TO RETARD THE NORTHWARD SPREAD THROUGH MEXICO AND INTO THE UNITED STATES. THE SAME ASSUMPTIONS WERE MADE IN PREPARING OPTION 4 AS WERE MADE FOR OPTIONS 2 AND 3 -- THE ONLY DIFFERENCES BEING THAT NO EFFORT TO RETARD SPREAD BELOW THE TEXAS-MEXICO BORDER WOULD BE MADE. AN IMPORTANT ASSUMPTION FOR ALL THESE OPTIONS IS THAT EACH STATE, AS WELL AS GUATEMALA AND MEXICO, WOULD CONDUCT A PROGRAM TO PROTECT THEIR COUNTRIES HOST CROPS.

PESSIM 2 GUATEMALA - BARRIER ZONE IN GUATEMALA MARCH 1976

PESSIMISTIC

OPTION 2 ASSUMES THAT A BARRIER ZONE WILL BE ERECTED IN GUATEMALA TO PREVENT OR GREATLY RETARD THE NORTHWARD SPREAD OF THE MEDITERRANEAN FRUIT FLY TO BELIZE AND MEXICO. THE BARRIER ZONE WOULD ESSENTIALLY ERADICATE THE MEDITERRANEAN FRUIT FLY FROM A ZONE 60 MILES DEEP, USING AN INTEGRATION OF TOXIC BAITS, ULV MALATHION, TRAPS BAITED WITH LURES, CULTURAL PRACTICES, STERILE MALE RELEASES, AND QUARANTINE MEASURES. BREACHING OF THE GUATEMALA BARRIER WOULD BE FOLLOWED BY A BARRIER ZONE IN THE ISTHUS OF TEHUANTEPEC. BREACHING OF THE BARRIER ZONE AT TEHUANTEPEC WOULD BE FOLLOWED BY A GRADUAL SHIFTING OF A BARRIER ZONE AS THE INFESTATION SLOWLY MOVED NORTHWARD AND FINALLY INFESTED ALL OF ITS ECOLOGICAL RANGE IN NORTH AMERICA. THE COST OF MAINTAINING A BARRIER ZONE WAS ESTIMATED FROM A 1971 STUDY BY ECONOMIC RESEARCH SERVICE. IN ADDITION, IT WAS ASSUMED THAT AN AVERAGE OF 4 ISOLATED INFESTATIONS ABOVE THE BARRIER ZONE WOULD OCCUR EACH YEAR. THE COST OF ERADICATING THESE INFESTATIONS ADDED AN AVERAGE OF \$4.876/ACRE TO POTENTIAL COSTS (PC). THIS OPTION ALSO INCLUDES THE COST OF ERADICATING THE 1975 INFESTATION IN LOS ANGELES COUNTY, CALIFORNIA. THE TOTAL COST OF ERADICATING THIS INFESTATION WAS ESTIMATED AT \$931,000 DURING 1976 WITH AN ADDITIONAL \$3,000 BEING SPENT IN 1977 AND \$1,000 IN 1978 FOR SURVEY AND FOLLOWUP WORK.





>>>>>>>>> SUMMARY OF BENEFIT/COST ANALYSIS <<<<<<<<<

CROP-AREA	YEARS TILL -ARRIVAL OF PEST		YEARS TILL SPREAD OF PEST	POTENTIAL LOSSES		POTENTIAL COST		ACRES OF HOST CROP
	T1	T2		MILLIONS OF DOLLARS PL	YEARS IN AREA K	DOLLARS PER ACRE PC		
GUATEMALA								
PESSIM 1	-2	2	8.121	0	0.0	23500.		
PESSIM 3	-2	2	8.121	0	0.0	23500.		
PESSIM 4	-2	2	8.121	0	0.0	23500.		
PESSIM 2	-2	5	8.121	4	35.229	23500.		
SOTHERN MEXICO								
PESSIM 1	2	4	23.986	0	0.0	694698.		
PESSIM 3	2	4	23.986	0	0.0	694698.		
PESSIM 4	2	4	23.986	0	0.0	694698.		
PESSIM 2	5	14	23.986	5	35.229	694698.		
NORTHERN MEXICO								
PESSIM 1	4	8	48.044	0	0.0	1389418.		
PESSIM 3	5	13	48.044	5	35.229	1389418.		
PESSIM 4	4	9	48.044	0	0.0	1389418.		
PESSIM 2	14	22	48.044	5	35.229	1389418.		
TEXAS								
PESSIM 1	8	10	13.574	0	0.0	162900.		
PESSIM 3	13	19	13.574	5	41.443	162900.		
PESSIM 4	16	22	13.574	5	41.443	162900.		
PESSIM 2	16	28	13.574	5	41.443	162900.		
ARIZONA								
PESSIM 1	10	13	21.101	0	0.0	57700.		
PESSIM 3	19	23	21.101	4	41.443	57700.		
PESSIM 4	19	23	21.101	4	41.443	57700.		
PESSIM 2	24	28	21.101	4	41.443	57700.		
FLORIDA								
PESSIM 1	7	14	22.296	0	0.0	937065.		
PESSIM 3	7	16	22.296	6	41.443	937065.		
PESSIM 4	6	15	22.296	6	41.443	937065.		
PESSIM 2	8	18	22.296	6	41.443	937065.		
GEORGIA								
PESSIM 1	9	12	3.285	0	0.0	181100.		
PESSIM 3	12	17	3.285	2	41.443	181100.		
PESSIM 4	11	13	3.285	2	41.443	181100.		
PESSIM 2	14	18	3.285	2	41.443	181100.		
ALABAMA								
PESSIM 1	8	12	0.465	0	0.0	24400.		
PESSIM 3	11	14	0.465	2	41.443	24400.		
PESSIM 4	11	14	0.465	2	41.443	24400.		
PESSIM 2	17	21	0.465	2	41.443	24400.		
S. CAROLINA								
PESSIM 1	8	12	0.612	0	0.0	44300.		
PESSIM 3	13	18	0.612	2	41.443	44300.		
PESSIM 4	11	16	0.612	2	41.443	44300.		





PESSIM 2	20	25	0.612	2	41.443	44300.
LOUISIANA						
PESSIM 1	9	12	0.208	0	0.0	10500.
PESSIM 3	12	15	0.208	1	41.443	10500.
PESSIM 4	11	16	0.208	1	41.443	10500.
PESSIM 2	12	15	0.208	1	41.443	10500.
MISSISSIPPI						
PESSIM 1	9	12	0.797	0	0.0	7540.
PESSIM 3	13	16	0.797	1	41.443	7540.
PESSIM 4	12	15	0.797	1	41.443	7540.
PESSIM 2	13	16	0.797	1	41.443	7540.
CALIFORNIA						
PESSIM 1	12	16	144.000	0	0.0	373000.
PESSIM 3	22	28	144.000	6	41.443	373000.
PESSIM 4	21	27	144.000	6	41.443	373000.
PESSIM 2	20	32	144.000	6	41.443	373000.
TOTALS OR AVERAGES						
	MIN	MAX		MAX		
PESSIM 1	-2	16	286.489	0	0.0	3906121.
PESSIM 3	-2	28	286.489	6	31.613	3906121.
PESSIM 4	-2	27	286.489	6	19.082	3906121.
PESSIM 2	-2	32	286.489	6	38.090	3906121.



>>>>>>> SUMMARY OF BENEFIT/COST ANALYSIS <<<<<<<

PESSIM 1  
PESSIM 3  
PESSIM 4  
PESSIM 2

YEAR	1	2	3	4	5	6	7	8
PESSIM 1	931000.	3000.	1000.	0.	0.	0.	0.	0.
PESSIM 3	931000.	3000.	1000.	0.	0.	0.	0.	0.
PESSIM 4	931000.	3000.	1000.	0.	0.	0.	0.	0.
PESSIM 2	931000.	3000.	1000.	0.	0.	0.	0.	0.



&gt;&gt;&gt;&gt;&gt;&gt;&gt;&gt;&gt; SUMMARY OF BENEFIT/COST ANALYSIS &lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;&lt;

## GRAND SUMMARY TABLE

ALL VALUES IN MILLIONS OF DOLLARS												
UNDISCOUNTED VALUES										PRESENT VALUES		
OPTION	COST OF EXECUTING OPTION	DIFFER- ENCE IN COST	ACCRUAL PERIOD IN YEARS	ACCRUAL RATE AT END OF ACCRUAL PERIOD	SUM OF LOSSES	SUM OF BENEFITS	ACCRUAL PERIOD IN YEARS	ACCRUAL RATE OF END OF ACCRUAL PERIOD	UNDIS- COUNTED B/C RATIO	DIFFER- ENCE IN COST	DIFFER- ENCE IN LOSSES =BENEFITS	B/C RATIO
PESSIM 3 OVER	636.199	635.264	33	0.000	4494.881	2067.386	33	0.000	3:1	267.313	416.737	2:1
PESSIM 1	0.935		33	0.0	6562.267		33					
PESSIM 4 OVER	391.462	390.527	32	0.000	4464.310	1811.469	32	0.000	5:1	144.642	342.620	2:1
PESSIM 1	0.935		32	0.0	6275.778		32					
PESSIM 2 OVER	759.415	758.479	37	0.000	4235.700	3472.524	37	0.000	5:1	231.259	716.602	3:1
PESSIM 1	0.935		37	0.0	7708.223		37					
PESSIM 4 OVER	391.462	-244.738	33	0.000	4750.799	-255.918	33	-0.000	1:1	-122.670	-74.118	1:1
PESSIM 3	636.199		33	0.000	4494.881		33					
PESSIM 2 OVER	759.415	123.215	37	0.000	4235.700	1405.138	37	0.000	11:1	-36.054	299.865	-8:1
PESSIM 3	636.199		37	0.0	5640.837		37					
PESSIM 2 OVER	759.415	367.953	37	0.000	4235.700	1661.055	37	0.000	5:1	86.617	373.983	4:1
PESSIM 4	391.462		37	0.0	5896.755		37					

\*\*\*\*\* END OF BENEFIT/COST ANALYSIS FOR \*\*\*\*\*



OPTIM 1 DO NOTHING - ERADICATION OF 1975 CALIF. INFESTATION SUCCESSFUL.

OPTIMISTIC

OPTION 1 ASSUMES THAT NEITHER GOVERNMENTS OF GUATEMALA, MEXICO, NOR THE UNITED STATES WILL CONDUCT A PROGRAM TO RETARD THE SPREAD OF THE MEDITERRANEAN FRUIT FLY FROM CENTRAL AMERICA TO THE SUSCEPTIBLE AREAS IN NORTH AMERICA AND MEXICO. A FURTHER ASSUMPTION IS THAT THE PRODUCERS OF THE HOST CROPS WILL EMPLOY EXISTING PEST CONTROL TECHNOLOGY SIMILAR TO THAT IN USE IN THE MEDITERRANEAN COUNTRIES, TO COMBAT THIS PEST. UNREALIZED YIELDS WILL, THEREFORE, BE HELD TO A LEVEL COMMENSURATE WITH THE PRODUCER'S PERCEIVED BENEFITS FROM SUCH CONTROL MEASURES. THE POTENTIAL LOSSES GIVEN BELOW INCLUDE THE VALUE OF UNREALIZED YIELDS PLUS THE COST OF CONTROL INCURRED BY THE FARMER IN PROTECTING HIS CROPS. THE VALUES USED AS INPUTS TO THIS BENEFIT/COST ANALYSIS ARE CRUDE ESTIMATES AND REPRESENT EXPEDIENT ESTIMATES TO PERMIT MAKING A FIRST APPROXIMATION OF THE BENEFITS AND COSTS OF CONDUCTING A MEDITERRANEAN FRUIT FLY PROGRAM IN EITHER MEXICO OR GUATEMALA. THE 'DO NOTHING' OPTION IS INCLUDED TO FORM A BASIS FOR ESTIMATING THE BENEFITS AND COSTS OF THE OTHER OPTIONS. IT WAS ASSUMED THAT EACH ACRE OF HOST CROP WOULD RECEIVE 4 INSECTICIDE APPLICATIONS AT \$3.50/ACRE/ APPLICATION EXCEPT FOR MEXICO AND GUATEMALA WHERE ONLY 2 APPLICATIONS WERE ASSUMED, OWING TO THE LOWER TECHNOLOGICAL AGRICULTURE BASE. IT WAS FURTHER ASSUMED THAT THE INFESTATION IN CALIFORNIA WOULD BE ERADICATED AT A COST OF \$935000 OVER THE NEXT THREE YEARS.

OPTIM 3 TEHAUANTEPEC BARRIER ZONE MARCH 1976 OPTIMISTIC

OPTIMISTIC

OPTION 3 ASSUMES THAT A BARRIER ZONE WILL BE ERECTED AT THE ISTHMUS OF TEHUANTEPEC, MEXICO, TO PREVENT OR GREATLY RETARD THE NORTHWARD SPREAD OF THE MEDITERRANEAN FRUIT FLY. THE BARRIER ZONE WOULD MEASURE 60-MILES-DEEP AND 80-MILES-ACROSS. THE MEDITERRANEAN FRUIT FLY POPULATION IN THE BARRIER ZONE WOULD BE MAINTAINED AT NEAR ZERO LEVEL THROUGH THE USE OF TRAPS, ULV MALATHION, TOXIC BAITS, CULTURAL PRACTICES AND QUARANTINE MEASURES. SUCH A BARRIER ZONE, IT WAS ASSUMED, WOULD PREVENT SPREAD FOR EIGHT YEARS. AFTER WHICH THE BARRIER ZONE WOULD BE MOVED SLOWLY AHEAD OF SPREAD. INFESTATIONS ABOVE THE BARRIER ZONE WOULD BE ERADICATED THROUGH THE USE OF ULV MALATHION, TOXIC BAITS, AND STERILE MALE RELEASES. THE COST OF CONDUCTING SUCH A PROGRAM INCLUDES THE ERADICATION OF ISOLATED INFESTATIONS ABOVE THE BARRIER ZONE. THE COST OF MAINTAINING A BARRIER ZONE WAS ESTIMATED FROM A 1971 STUDY BY ECONOMIC RESEARCH SERVICE, USDA. IN ADDITION, IT WAS ASSUMED THAT AN AVERAGE OF 4 ISOLATED INFESTATIONS ABOVE THE BARRIER ZONE WOULD OCCUR EACH YEAR. THE COST OF ERADICATING THESE INFESTATIONS ADDED AN AVERAGE OF \$4.876/ACRE TO POTENTIAL COST(PC). THIS OPTION ALSO INCLUDES THE COST OF ERADICATING THE 1975-1976 INFESTATION IN LOS ANGELES COUNTY, CALIFORNIA.





MEDITERRANEAN FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

CROP-AREA	YEARS TILL ARRIVAL OF PEST		YEARS TILL SPREAD OF PEST	POTENTIAL LOSSES MILLIONS OF DOLLARS PL	YEARS IN AREA K	POTENTIAL COST DOLLARS PER ACRE		ACRES OF HOST CROP
	T1	T2				K	PC	
GUATEMALA	OPTIM 1	-2	2	8.121	0	0.0	23500.	23500.
	OPTIM 3	-2	2	8.121	0	0.0		
SOTHERN MEXICO	OPTIM 1	2	4	23.986	0	0.0	694698.	694698.
	OPTIM 3	2	4	23.986	0	0.0		
NORTHERN MEXICO	OPTIM 1	4	8	48.044	0	0.0	1389418.	1389418.
	OPTIM 3	5	13	48.044	5	35.229		
TEXAS	OPTIM 1	8	10	13.574	0	0.0	162900.	162900.
	OPTIM 3	13	19	13.574	5	41.443		
ARIZONA	OPTIM 1	8	11	21.101	0	0.0	57700.	57700.
	OPTIM 3	17	21	21.101	4	41.443		
FLORIDA	OPTIM 1	5	12	22.296	0	0.0	937065.	937065.
	OPTIM 3	5	14	22.296	6	41.443		
GEORGIA	OPTIM 1	7	10	3.285	0	0.0	181100.	181100.
	OPTIM 3	11	15	3.285	2	41.443		
ALABAMA	OPTIM 1	7	9	0.465	0	0.0	24400.	24400.
	OPTIM 3	10	13	0.465	2	41.443		
S. CAROLINA	OPTIM 1	7	9	0.612	0	0.0	44300.	44300.
	OPTIM 3	12	17	0.612	2	41.443		
LOUISIANA	OPTIM 1	7	9	0.208	0	0.0	10500.	10500.
	OPTIM 3	8	11	0.208	1	41.443		
MISSISSIPPI	OPTIM 1	8	10	0.797	0	0.0	7540.	7540.
	OPTIM 3	10	12	0.797	1	41.443		
CALIFORNIA	OPTIM 1	7	9	144.000	0	0.0	373000.	373000.
	OPTIM 3	11	14	144.000	6	41.443		
TOTALS OR AVERAGES					MAX			
	OPTIM 1	-2	12	286.489	0	0.0	3906121.	3906121.
	OPTIM 3	-2	21	286.489	6	31.613		



MEDITERRANEAN FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

YEAR	LOSSES OPTIM 1	LOSSES OPTIM 3	BENEFITS OF OPTIM 3	DISCOUNTED BENEFITS	ACCUMULATED DISCOUNTED BENEFITS
ALL VALUES IN MILLIONS OF DOLLARS					
1	8.041	8.041	-0.000	-0.000	-0.000
2	8.123	8.123	-0.000	-0.000	-0.000
3	20.114	20.114	-0.000	-0.000	-0.000
4	32.110	32.105	0.004	0.003	0.003
5	32.585	32.114	0.471	0.292	0.295
6	56.160	32.172	23.988	13.540	13.836
7	80.113	32.715	47.397	24.322	38.158
8	157.654	37.463	120.191	56.070	94.228
9	254.262	62.032	192.230	81.525	175.753
10	285.129	92.385	192.745	74.312	250.064
11	286.456	101.624	184.832	64.783	314.847
12	286.487	110.135	176.352	56.192	371.039
13	286.489	243.155	43.334	12.552	383.591
14	286.489	251.265	35.224	9.276	392.867
15	286.489	252.332	34.157	8.177	401.044
16	286.489	258.599	27.890	6.070	407.114
17	286.489	264.788	21.701	4.293	411.407
18	286.489	265.568	20.921	3.763	415.170
19	286.489	275.937	10.552	1.725	416.895
20	286.489	286.280	0.209	0.031	416.926
21	286.489	286.487	0.002	0.000	416.927
22	286.489	286.489	0.000	0.000	416.927
23	286.489	286.489	0.000	0.000	416.927
24	286.489	286.489	0.000	0.000	416.927
25	286.489	286.489	0.000	0.000	416.927
26	286.489	286.489	0.000	0.000	416.927
TOTALS	5518.078	4385.878	1132.200	416.927	416.927



MEDITERRANEAN FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

PRESENT FUNDING, DOLLARS

OPTIM 1 0.  
OPTIM 3 0.

ANTICIPATED CONTINGENCY MONEY, DOLLARS

YEAR	1	2	3
OPTIM 1	931000.	3000.	1000.
OPTIM 3	931000.	3000.	1000.

	4	5	6	7	8
	0.	0.	0.	0.	0.
	0.	0.	0.	0.	0.



MEDITERRANEAN FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

	COST		COST	COST		COST	COST		CUMULATIVE
	OPTIM 1	1	OPTIM 3	DIFFERENCE	3 - 1	DISCOUNTED	ADDITIONAL	DISCOUNTED	
1	0.931		1.211	0.280		0.255		0.255	
2	0.003		2.010	2.207		1.824		2.079	
3	0.001		14.717	14.716		11.056		13.135	
4	0.0		53.041	53.041		36.228		49.363	
5	0.0		81.604	81.604		50.670		100.032	
6	0.0		87.673	87.673		49.490		149.522	
7	0.0		101.761	101.761		52.219		201.741	
8	0.0		97.079	97.079		45.288		247.029	
9	0.0		68.956	68.956		29.244		276.274	
10	0.0		31.690	31.690		12.218		288.491	
11	0.0		25.921	25.921		9.085		297.577	
12	0.0		29.157	29.157		9.290		306.867	
13	0.0		12.786	12.786		3.704		310.571	
14	0.0		8.417	8.417		2.217		312.787	
15	0.0		7.900	7.900		1.891		314.678	
16	0.0		5.750	5.750		1.251		315.930	
17	0.0		2.690	2.690		0.532		316.462	
18	0.0		2.382	2.382		0.428		316.891	
19	0.0		1.196	1.196		0.196		317.086	
20	0.0		0.024	0.024		0.004		317.090	
21	0.0		0.000	0.000		0.000		317.090	
22	0.0		0.000	0.000		0.000		317.090	
23	0.0		0.000	0.000		0.000		317.090	
24	0.0		0.000	0.000		0.000		317.090	
25	0.0		0.000	0.000		0.000		317.090	
26	0.0		0.000	0.000		0.000		317.090	
TOTALS	0.935		636.165	635.230		317.090		317.090	

ALL VALUES IN MILLIONS OF DOLLARS





MEDITERRANEAN FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

SUMMARY OF  
OPTIM 3 OVER OPTIM 1

>>>>>>>> PRESENT VALUES <<<<<<<<<<<<

THE PRESENT VALUE OF THE BENEFITS OF SELECTING OPTIM 3 OVER OPTIM 1 DISCOUNTED AT 10.0 PERCENT INTEREST IS 416.927 MILLIONS OF DOLLARS AND WILL ACCRUE OVER 26 YEARS.

THE PRESENT VALUE OF THE DIFFERENCE IN COSTS OF SELECTING OPTIM 3 OVER OPTIM 1 WHEN DISCOUNTED AT 10.0 PERCENT INTEREST IS 317.090 MILLIONS OF DOLLARS AND WILL ACCRUE OVER 26 YEARS.

THE PRESENT VALUE OF THE BENEFIT/COST RATIO OF OPTIM 3 OVER OPTIM 1 IS 1:1 WHEN DISCOUNTED AT 10.0 PERCENT INTEREST.

THE PRESENT VALUE OF THE NET BENEFITS OF SELECTING OPTIM 3 OVER OPTIM 1 IS 99.837 MILLIONS OF DOLLARS WHEN DISCOUNTED AT 10.0 PERCENT INTEREST.

>>>>>>>> UNDISCOUNTED VALUES <<<<<<<<<<<<

THE SUM OF THE UNDISCOUNTED BENEFITS OF SELECTING OPTIM 3 OVER OPTIM 1 IS 1132.200 MILLIONS OF DOLLARS WHEN ACCRUED OVER 26 YEARS, AND MAY CONTINUE TO ACCRUE AT 0.000 MILLIONS OF DOLLARS PER ANNUM FOREVER.

THE UNDISCOUNTED COST OF EXECUTING OPTIM 3 IS 636.165 MILLIONS OF DOLLARS WHEN SUMMED OVER 26 YEARS AND MAY CONTINUE TO ACCRUE AT 0.000 MILLIONS OF DOLLARS PER ANNUM FOREVER.

THE UNDISCOUNTED COST OF EXECUTING OPTIM 1 IS 0.935 MILLIONS OF DOLLARS WHEN SUMMED OVER 26 YEARS AND MAY CONTINUE TO ACCRUE AT 0.0 MILLIONS OF DOLLARS PER ANNUM FOREVER.

THE UNDISCOUNTED DIFFERENCE IN COST OF SELECTING OPTIM 3 OVER OPTIM 1 IS 635.230 MILLIONS OF DOLLARS WHEN SUMMED OVER 26 YEARS.

THE UNDISCOUNTED NET BENEFITS OF SELECTING OPTIM 3 OVER OPTIM 1 IS 496.969 MILLIONS OF DOLLARS WHEN SUMMED OVER 26 AND 26 YEARS RESPECTFULLY.

THE UNDISCOUNTED BENEFIT/COST RATIO OF SELECTING OPTIM 3 OVER OPTIM 1 IS 2:1 WHEN SUMMED OVER 26 AND 26 YEARS RESPECTFULLY.

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OPTIM 1 DO NOTHING - ERADICATION OF 1975 CALIF. INFESTATION SUCCESSFUL.  
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OPTIMISTIC  
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OPTION 1 ASSUMES THAT NEITHER GOVERNMENTS OF GUATEMALA, MEXICO, NOR THE UNITED STATES WILL CONDUCT A PROGRAM TO RETARD THE SPREAD OF THE MEDITERRANEAN FRUIT FLY FROM CENTRAL AMERICA TO THE SUSCEPTIBLE AREAS IN NORTH AMERICA AND MEXICO. A FURTHER ASSUMPTION IS THAT THE PRODUCERS OF THE HOST CROPS WILL EMPLOY EXISTING PEST CONTROL TECHNOLOGY SIMILAR TO THAT IN USE IN THE MEDITERRANEAN COUNTRIES, TO COMBAT THIS PEST. UNREALIZED YIELDS WILL, THEREFORE, BE HELD TO A LEVEL COMMENSURATE WITH THE PRODUCER'S PERCEIVED BENEFITS FROM SUCH CONTROL MEASURES. THE POTENTIAL LOSSES GIVEN BELOW INCLUDE THE VALUE OF UNREALIZED YIELDS PLUS THE COST OF CONTROL INCURRED BY THE FARMER IN PROTECTING HIS CROPS. THE VALUES USED AS INPUTS TO THIS BENEFIT/COST ANALYSIS ARE CRUDE ESTIMATES AND REPRESENT EXPEDIENT ESTIMATES TO PERMIT MAKING A FIRST APPROXIMATION OF THE BENEFITS AND COSTS OF CONDUCTING A MEDITERRANEAN FRUIT FLY PROGRAM IN EITHER MEXICO OR GUATEMALA. THE 'DO NOTHING' OPTION IS INCLUDED TO FORM A BASIS FOR ESTIMATING THE BENEFITS AND COSTS OF THE OTHER OPTIONS. IT WAS ASSUMED THAT EACH ACRE OF HOST CROP WOULD RECEIVE 4 INSECTICIDE APPLICATIONS AT \$3.50/ACRE/ APPLICATION EXCEPT FOR MEXICO AND GUATEMALA WHERE ONLY 2 APPLICATIONS WERE ASSUMED. OWING TO THE LOWER TECHNOLOGICAL AGRICULTURE BASE. IT WAS FURTHER ASSUMED THAT THE INFESTATION IN CALIFORNIA WOULD BE ERADICATED AT A COST OF \$935000 OVER THE NEXT THREE YEARS.  
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OPTIM 4 TEXAS-MEXICO BARRIER ZONE ALONG THE RIO GRANDE RIVER MARCH 1976  
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OPTIMISTIC  
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OPTION 4 ASSUMES THAT NO EFFORT WILL BE MADE TO RETARD SPREAD OF THE MEDITERRANEAN FRUIT FLY BEFORE IT REACHES THE TEXAS-MEXICO BORDER. THE SCENARIO IS SIMILAR TO THAT FOLLOWED FOR CITRUS BLACKFLY--WHERE A BARRIER ZONE WAS MAINTAINED SOUTH OF THE RIO GRANDE RIVER FOR MANY YEARS. THE PER ACRE COST OF MAINTAINING A BARRIER ZONE WAS ASSUMED TO BE CONSTANT EXCEPT FOR GUATEMALA AND MEXICO, WHERE BECAUSE OF LOWER LABOR COSTS PC AS REDUCED 15 PERCENT. PROGRAM COSTS AND LOSSES TO THE MEDITERRANEAN FRUIT FLY ARE EXPEDIENT ESTIMATES TO PERMIT A FIRST APPROXIMATION OF THE BENEFITS AND COSTS OF A PROGRAM TO RETARD THE NORTHWARD SPREAD THROUGH MEXICO AND INTO THE UNITED STATES. THE SAME ASSUMPTIONS WERE MADE IN PREPARING OPTION 4 AS WERE MADE FOR OPTIONS 2 AND 3 -- THE ONLY DIFFERENCES BEING THAT NO EFFORT TO RETARD SPREAD BELOW THE TEXAS-MEXICO BORDER WOULD BE MADE. AN IMPORTANT ASSUMPTION FOR ALL THESE OPTIONS IS THAT EACH STATE, AS WELL AS GUATEMALA AND MEXICO, WOULD CONDUCT A PROGRAM TO PROTECT THEIR COUNTRIES HOST CROPS.  
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## MEDITERRANEAN FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

CROP-AREA		YEARS TILL ARRIVAL OF PEST		YEARS TILL SPREAD OF PEST		POTENTIAL LOSSES MILLIONS OF DOLLARS		YEARS IN AREA		POTENTIAL COST DOLLARS PER ACRE		ACRES OF HOST CROP
		T1	T2	T1	T2	PL	PC	K	K	PC	PC	
GUATEMALA	OPTIM 1	-2	2			8.121	0.0	0	0	0.0	0.0	23500.
	OPTIM 4	-2	2			8.121	0.0	0	0	0.0	0.0	23500.
SOTHERN MEXICO	OPTIM 1	2	4			23.986	0.0	0	0	0.0	0.0	694698.
	OPTIM 4	2	4			23.986	0.0	0	0	0.0	0.0	694698.
NORTHERN MEXICO	OPTIM 1	4	8			48.044	0.0	0	0	0.0	0.0	1389418.
	OPTIM 4	4	9			48.044	0.0	0	0	0.0	0.0	1389418.
TEXAS	OPTIM 1	8	10			13.574	0.0	0	0	0.0	0.0	162900.
	OPTIM 4	13	19			13.574	41.443	5	5	41.443	41.443	162900.
ARIZONA	OPTIM 1	8	11			21.101	0.0	0	0	0.0	0.0	57700.
	OPTIM 4	17	21			21.101	41.443	4	4	41.443	41.443	57700.
FLORIDA	OPTIM 1	5	12			22.296	0.0	0	0	0.0	0.0	937065.
	OPTIM 4	5	14			22.296	41.443	6	6	41.443	41.443	937065.
GEORGIA	OPTIM 1	7	10			3.285	0.0	0	0	0.0	0.0	181100.
	OPTIM 4	9	13			3.285	41.443	2	2	41.443	41.443	181100.
ALABAMA	OPTIM 1	7	9			0.465	0.0	0	0	0.0	0.0	24400.
	OPTIM 4	8	11			0.465	41.443	2	2	41.443	41.443	24400.
S. CAROLINA	OPTIM 1	7	9			0.612	0.0	0	0	0.0	0.0	44300.
	OPTIM 4	10	15			0.612	41.443	2	2	41.443	41.443	44300.
LOUISIANA	OPTIM 1	7	9			0.208	0.0	0	0	0.0	0.0	10500.
	OPTIM 4	7	10			0.208	41.443	1	1	41.443	41.443	10500.
MISSISSIPPI	OPTIM 1	8	10			0.797	0.0	0	0	0.0	0.0	7540.
	OPTIM 4	9	11			0.797	41.443	1	1	41.443	41.443	7540.
CALIFORNIA	OPTIM 1	7	9			144.000	0.0	0	0	0.0	0.0	373000.
	OPTIM 4	11	14			144.000	41.443	6	6	41.443	41.443	373000.
TOTALS OR AVERAGES		MIN	MAX					MAX				
	OPTIM 1	-2	12			286.489	0.0	0	0	0.0	0.0	3906121.
	OPTIM 4	-2	21			286.489	19.082	6	6	19.082	19.082	3906121.





MEDITERRANEAN FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

YEAR	LOSSES OPTIM 1	LOSSES OPTIM 4	BENEFITS OF OPTIM 4	ALL VALUES IN MILLIONS OF DOLLARS	DISCOUNTED BENEFITS	ACCUMULATED DISCOUNTED BENEFITS
1	8.041	8.041	-0.000	-0.000	-0.000	-0.000
2	8.123	8.123	-0.000	-0.000	-0.000	-0.000
3	20.114	20.114	-0.000	-0.000	-0.000	-0.000
4	32.110	32.110	-0.000	-0.000	-0.000	-0.000
5	32.585	32.300	0.285	0.177	0.177	0.177
6	56.160	38.696	17.463	9.858	9.858	10.035
7	80.113	73.712	6.401	3.285	3.285	13.319
8	157.354	80.959	76.695	35.779	35.779	49.098
9	254.262	86.260	168.002	71.250	71.250	120.348
10	285.129	97.636	187.493	72.287	72.287	192.635
11	286.456	104.587	181.869	63.744	63.744	256.379
12	286.487	113.507	172.980	55.117	55.117	311.496
13	286.489	245.328	41.161	11.923	11.923	323.419
14	286.489	251.824	34.665	9.128	9.128	332.548
15	286.489	252.416	34.073	8.157	8.157	340.705
16	286.489	258.601	27.888	6.069	6.069	346.774
17	286.489	264.788	21.701	4.293	4.293	351.067
18	286.489	265.568	20.921	3.763	3.763	354.830
19	286.489	275.937	10.552	1.725	1.725	356.555
20	286.489	286.280	0.209	0.031	0.031	356.587
21	286.489	286.487	0.002	0.000	0.000	356.587
22	286.489	286.489	0.000	0.000	0.000	356.587
23	286.489	286.489	0.000	0.000	0.000	356.587
24	286.489	286.489	0.000	0.000	0.000	356.587
25	286.489	286.489	0.000	0.000	0.000	356.587
26	286.489	286.489	0.000	0.000	0.000	356.587
TOTALS	5518.078	4515.717	1002.361	356.587	356.587	356.587





MEDITERRANEAN AND FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

PRESENT FUNDING, DOLLARS

OPTIM 1 0.  
OPTIM 4 0.

ANTICIPATED CONTINGENCY MONEY, DOLLARS

YEAR	1	2	3
OPTIM 1	931000.	3000.	1000.
OPTIM 4	931000.	3000.	1000.

	4	5	6	7	8
	0.	0.	0.	0.	0.
	0.	0.	0.	0.	0.



MEDITERRANEAN FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

	COST		COST		COST		COST		CUMULATIVE	
	OPTIM 1	OPTIM 4	OPTIM 1	OPTIM 4	DIFFERENCE OPTIM 4 - 1	ADDITIONAL COST	DISCOUNTED	DISCOUNTED	COST	DISCOUNTED
1	0.931	1.162			0.231	0.210			0.210	
2	0.003	1.725			1.722	1.423			1.634	
3	0.001	10.267			10.266	7.713			9.347	
4	0.0	28.568			28.568	19.512			28.859	
5	0.0	37.110			37.110	23.043			51.902	
6	0.0	39.259			39.259	22.161			74.063	
7	0.0	53.411			53.411	27.408			101.471	
8	0.0	54.003			54.003	25.193			126.664	
9	0.0	48.942			48.942	20.756			147.420	
10	0.0	33.833			33.833	13.044			160.464	
11	0.0	25.884			25.884	9.072			169.536	
12	0.0	23.107			23.107	7.363			176.899	
13	0.0	7.703			7.703	2.231			179.131	
14	0.0	6.772			6.772	1.783			180.914	
15	0.0	7.648			7.648	1.831			182.745	
16	0.0	5.743			5.743	1.250			183.995	
17	0.0	2.690			2.690	0.532			184.527	
18	0.0	2.382			2.382	0.428			184.955	
19	0.0	1.196			1.196	0.196			185.151	
20	0.0	0.024			0.024	0.004			185.155	
21	0.0	0.000			0.000	0.000			185.155	
22	0.0	0.000			0.000	0.000			185.155	
23	0.0	0.000			0.000	0.000			185.155	
24	0.0	0.000			0.000	0.000			185.155	
25	0.0	0.000			0.000	0.000			185.155	
26	0.0	0.000			0.000	0.000			185.155	
TOTALS	0.935	391.432			390.497	185.155			185.155	

ALL VALUES IN MILLIONS OF DOLLARS



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>>>>>>> PRESENT VALUES <<<<<<<
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>>>>>> UNDISCOUNTED VALUES <<<<<<<

THE UNDISCOUNTED BENEFIT/COST RATIO OF SELECTING OPTIM 4 OVER OPTIM 1 IS 3:1 WHEN SUMMED OVER 26 AND 26 YEARS RESPECTFULLY.



OPTIM 1 DO NOTHING - ERADICATION OF 1975 CALIF. INFESTATION SUCCESSFUL.

OPTIMISTIC

OPTION 1 ASSUMES THAT NEITHER GOVERNMENTS OF GUATEMALA, MEXICO, NOR THE UNITED STATES WILL CONDUCT A PROGRAM TO RETARD THE SPREAD OF THE MEDITERRANEAN FRUIT FLY FROM CENTRAL AMERICA TO THE SUSCEPTIBLE AREAS IN NORTH AMERICA AND MEXICO. A FURTHER ASSUMPTION IS THAT THE PRODUCERS OF THE HOST CROPS WILL EMPLOY EXISTING PEST CONTROL TECHNOLOGY SIMILAR TO THAT IN USE IN THE MEDITERRANEAN COUNTRIES, TO COMBAT THIS PEST. UNREALIZED YIELDS WILL, THEREFORE, BE HELD TO A LEVEL COMMENSURATE WITH THE PRODUCER'S PERCEIVED BENEFITS FROM SUCH CONTROL MEASURES. THE POTENTIAL LOSSES GIVEN BELOW INCLUDE THE VALUE OF UNREALIZED YIELDS PLUS THE COST OF CONTROL INCURRED BY THE FARMER IN PROTECTING HIS CROPS. THE VALUES USED AS INPUTS TO THIS BENEFIT/COST ANALYSIS ARE CRUDE ESTIMATES AND REPRESENT EXPEDIENT ESTIMATES TO PERMIT MAKING A FIRST APPROXIMATION OF THE BENEFITS AND COSTS OF CONDUCTING A MEDITERRANEAN FRUIT FLY PROGRAM IN EITHER MEXICO OR GUATEMALA. THE 'DO NOTHING' OPTION IS INCLUDED TO FORM A BASIS FOR ESTIMATING THE BENEFITS AND COSTS OF THE OTHER OPTIONS. IT WAS ASSUMED THAT EACH ACRE OF HOST CROP WOULD RECEIVE 4 INSECTICIDE APPLICATIONS AT \$3.50/ACRE/ APPLICATION EXCEPT FOR MEXICO AND GUATEMALA WHERE ONLY 2 APPLICATIONS WERE ASSUMED, OWING TO THE LOWER TECHNOLOGICAL AGRICULTURE BASE. IT WAS FURTHER ASSUMED THAT THE INFESTATION IN CALIFORNIA WOULD BE ERADICATED AT A COST OF \$935000 OVER THE NEXT THREE YEARS.

OPTIM 2 GUATEMALA BARRIER ZONE OPTIMISTIC MARCH 1976

OPTIMISTIC

OPTION 2 ASSUMES THAT A BARRIER ZONE WILL BE ERECTED IN GUATEMALA TO PREVENT OR GREATLY RETARD THE NORTHWARD SPREAD OF THE MEDITERRANEAN FRUIT FLY TO BELIZE AND MEXICO. THE BARRIER ZONE WOULD ESSENTIALLY ERADICATE THE MEDITERRANEAN FRUIT FLY FROM A ZONE 60 MILES DEEP, USING AN INTEGRATION OF TOXIC BAITS, ULV MALATHION, TRAPS BAITED WITH LURES, CULTURAL PRACTICES, STERILE MALE RELEASES, AND QUARANTINE MEASURES. BREACHING OF THE GUATEMALA BARRIER WOULD BE FOLLOWED BY A BARRIER ZONE IN THE ISTHMX OF TEHUANTEPEC. BREACHING OF THE BARRIER ZONE AT TEHUANTEPEC WOULD BE FOLLOWED BY A GRADUAL SHIFTING OF A BARRIER ZONE AS THE INFESTATION SLOWLY MOVED NORTHWARD AND FINALLY INFESTED ALL OF ITS ECOLOGICAL RANGE IN NORTH AMERICA. THE COST OF MAINTAINING A BARRIER ZONE WAS ESTIMATED FROM A 1971 STUDY BY ECONOMIC RESEARCH SERVICE. IN ADDITION, IT WAS ASSUMED THAT AN AVERAGE OF 4 ISOLATED INFESTATIONS ABOVE THE BARRIER ZONE WOULD OCCUR EACH YEAR. THE COST OF ERADICATING THESE INFESTATIONS ADDED AN AVERAGE OF \$4.876/ACRE TO POTENTIAL COSTS (PC). THIS OPTION ALSO INCLUDES THE COST OF ERADICATING THE 1975 INFESTATION IN LOS ANGELES COUNTY, CALIFORNIA. THE TOTAL COST OF ERADICATING THIS INFESTATION WAS ESTIMATED AT \$931,000 DURING 1976 WITH AN ADDITIONAL \$3,000 BEING SPENT IN 1977 AND \$1,000 IN 1978 FOR SURVEY AND FOLLOWUP WORK.





MEDITERRANEAN FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

CROP-AREA	YEARS TILL ARRIVAL OF PEST T1	YEARS TILL SPREAD OF PEST T2	POTENTIAL LOSSES MILLIONS OF DOLLARS PL	YEARS IN AREA K	POTENTIAL COST DOLLARS PER ACRE PC	ACRES OF HOST CROP
GUATEMALA						
OPTIM 1	-2	2	8.121	0	0.0	23500.
OPTIM 2	-2	4	8.121	4	35.229	23500.
SOTHERN MEXICO						
OPTIM 1	2	4	23.986	0	0.0	694698.
OPTIM 2	4	10	23.986	5	35.229	694698.
NORTHERN MEXICO						
OPTIM 1	4	8	48.044	0	0.0	1389418.
OPTIM 2	10	18	48.044	5	35.229	1389418.
TEXAS						
OPTIM 1	8	10	13.574	0	0.0	162900.
OPTIM 2	18	22	13.574	5	41.443	162900.
ARIZONA						
OPTIM 1	8	11	21.101	0	0.0	57700.
OPTIM 2	19	23	21.101	4	41.443	57700.
FLORIDA						
OPTIM 1	5	12	22.296	0	0.0	937065.
OPTIM 2	7	17	22.296	6	41.443	937065.
GEORGIA						
OPTIM 1	7	10	3.285	0	0.0	181100.
OPTIM 2	12	16	3.285	2	41.443	181100.
ALABAMA						
OPTIM 1	7	9	0.465	0	0.0	24400.
OPTIM 2	10	13	0.465	2	41.443	24400.
S. CAROLINA						
OPTIM 1	7	9	0.612	0	0.0	44300.
OPTIM 2	13	18	0.612	2	41.443	44300.
LOUISIANA						
OPTIM 1	7	9	0.208	0	0.0	10500.
OPTIM 2	9	12	0.208	1	41.443	10500.
MISSISSIPPI						
OPTIM 1	8	10	0.797	0	0.0	7540.
OPTIM 2	11	13	0.797	1	41.443	7540.
CALIFORNIA						
OPTIM 1	7	9	144.000	0	0.0	373000.
OPTIM 2	26	32	144.000	6	41.443	373000.
TOTALS OR AVERAGES	MIN	MAX				
OPTIM 1	-2	12	286.489	0	0.0	3906121.
OPTIM 2	-2	32	286.489	6	38.090	3906121.



MEDITERRANEAN FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

YEAR	LOSSES OPTIM 1	LOSSES OPTIM 2	BENEFITS OF OPTIM 2	DISCOUNTED BENEFITS	ACCUMULATED DISCOUNTED BENEFITS
ALL VALUES IN MILLIONS OF DOLLARS					
1	8.041	4.061	3.980	3.618	3.618
2	8.123	7.761	0.362	0.299	3.917
3	20.114	8.104	12.010	9.024	12.941
4	32.110	8.123	23.987	16.383	29.324
5	32.585	8.173	24.412	15.158	44.482
6	56.160	9.185	46.975	26.516	70.999
7	80.113	20.116	59.996	30.788	101.786
8	157.054	31.057	126.597	59.058	160.845
9	254.262	32.144	222.118	94.200	255.045
10	285.129	32.665	252.464	97.336	352.381
11	286.456	35.424	251.032	87.986	440.367
12	286.487	44.782	241.705	77.015	517.382
13	286.489	57.223	229.266	66.411	583.793
14	286.489	80.994	205.495	54.114	637.906
15	286.489	102.798	183.691	43.975	681.881
16	286.489	107.240	179.249	39.010	720.891
17	286.489	107.761	178.728	35.361	756.252
18	286.489	107.810	178.679	32.137	788.389
19	286.489	107.950	178.539	29.193	817.582
20	286.489	114.810	171.679	25.519	843.101
21	286.489	131.804	154.685	20.903	864.004
22	286.489	142.279	144.210	17.716	881.720
23	286.489	142.487	144.002	16.082	897.802
24	286.489	142.489	144.000	14.620	912.422
25	286.489	142.490	143.999	13.291	925.712
26	286.489	142.503	143.986	12.081	937.794
27	286.489	142.798	143.691	10.961	948.754
28	286.489	148.875	137.614	9.543	958.297
29	286.489	214.489	72.000	4.539	962.836
30	286.489	280.103	6.386	0.366	963.202
31	286.489	286.180	0.309	0.016	963.218
32	286.489	286.475	0.014	0.001	963.219
33	286.489	286.488	0.001	0.000	963.219
34	286.489	286.489	0.000	0.000	963.219
35	286.489	286.489	0.000	0.000	963.219
36	286.489	286.489	0.000	0.000	963.219
37	286.489	286.489	0.000	0.000	963.219
TOTALS	8669.457	4663.596	4005.861	963.219	963.219



MEDITERRANEAN AND FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

PRESENT FUNDING, DOLLARS  
 OPTIM 1 0.  
 OPTIM 2 0.

ANTICIPATED CONTINGENCY MONEY, DOLLARS

YEAR	1	2	3
OPTIM 1	931000.	3000.	1000.
OPTIM 2	931000.	3000.	1000.

	4	5	6	7	8
	0.	0.	0.	0.	0.
	0.	0.	0.	0.	0.



MEDITERRANEAN FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

	COST		COST DIFFERENCE OPTIM 2 - 1	ADDITIONAL COST		CUMULATIVE COST DISCOUNTED
	OPTIM 1	OPTIM 2		DISCOUNTED	DISCOUNTED	
ALL VALUES IN MILLIONS OF DOLLARS						
1	0.931	2.434	1.503	1.367	1.367	1.367
2	0.003	12.301	12.298	10.164	10.164	11.530
3	0.001	23.545	23.544	17.689	17.689	29.219
4	0.0	25.370	25.370	17.328	17.328	46.547
5	0.0	29.736	29.736	18.464	18.464	65.011
6	0.0	42.854	42.854	24.190	24.190	89.201
7	0.0	46.240	46.240	23.728	23.728	112.929
8	0.0	43.394	43.394	20.244	20.244	133.173
9	0.0	63.117	63.117	26.768	26.768	159.941
10	0.0	83.719	83.719	32.277	32.277	192.218
11	0.0	83.149	83.149	29.143	29.143	221.361
12	0.0	71.792	71.792	22.875	22.875	244.237
13	0.0	57.414	57.414	16.631	16.631	260.868
14	0.0	30.821	30.821	8.116	8.116	268.984
15	0.0	9.631	9.631	2.306	2.306	271.289
16	0.0	7.469	7.469	1.625	1.625	272.915
17	0.0	8.006	8.006	1.584	1.584	274.499
18	0.0	9.124	9.124	1.641	1.641	276.140
19	0.0	9.076	9.076	1.484	1.484	277.624
20	0.0	5.745	5.745	0.854	0.854	278.478
21	0.0	1.296	1.296	0.175	0.175	278.653
22	0.0	0.710	0.710	0.087	0.087	278.740
23	0.0	7.729	7.729	0.863	0.863	279.603
24	0.0	14.773	14.773	1.500	1.500	281.103
25	0.0	15.425	15.425	1.424	1.424	282.527
26	0.0	15.455	15.455	1.297	1.297	283.823
27	0.0	15.425	15.425	1.177	1.177	285.000
28	0.0	14.773	14.773	1.024	1.024	286.024
29	0.0	7.729	7.729	0.487	0.487	286.512
30	0.0	0.686	0.686	0.039	0.039	286.551
31	0.0	0.033	0.033	0.002	0.002	286.553
32	0.0	0.002	0.002	0.000	0.000	286.553
33	0.0	0.000	0.000	0.000	0.000	286.553
34	0.0	0.000	0.000	0.000	0.000	286.553
35	0.0	0.000	0.000	0.000	0.000	286.553
36	0.0	0.000	0.000	0.000	0.000	286.553
37	0.0	0.000	0.000	0.000	0.000	286.553
TOTALS	0.935	758.970	758.034	286.553	286.553	286.553

ALL VALUES IN MILLIONS OF DOLLARS





MEDITERRANEAN AND FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

SUMMARY OF  
OPTIM 2 OVER OPTIM 1

>>>>>>> PRESENT VALUES <<<<<<<<<<

THE PRESENT VALUE OF THE BENEFITS OF SELECTING OPTIM 2 OVER OPTIM 1 DISCOUNTED AT 10.0 PERCENT INTEREST IS 963.219 MILLIONS OF DOLLARS AND WILL ACCRUE OVER 37 YEARS.

THE PRESENT VALUE OF THE DIFFERENCE IN COSTS OF SELECTING OPTIM 2 OVER OPTIM 1 WHEN DISCOUNTED AT 10.0 PERCENT INTEREST IS 286.553 MILLIONS OF DOLLARS AND WILL ACCRUE OVER 37 YEARS.

THE PRESENT VALUE OF THE BENEFIT/COST RATIO OF OPTIM 2 OVER OPTIM 1 IS 3:1 WHEN DISCOUNTED AT 10.0 PERCENT INTEREST.

THE PRESENT VALUE OF THE NET BENEFITS OF SELECTING OPTIM 2 OVER OPTIM 1 IS 676.666 MILLIONS OF DOLLARS WHEN DISCOUNTED AT 10.0 PERCENT INTEREST.

>>>>>>> UNDISCOUNTED VALUES <<<<<<<<

THE SUM OF THE UNDISCOUNTED BENEFITS OF SELECTING OPTIM 2 OVER OPTIM 1 IS 4005.861 MILLIONS OF DOLLARS WHEN ACCRUED OVER 37 YEARS, AND MAY CONTINUE TO ACCRUE AT 0.000 MILLIONS OF DOLLARS PER ANNUM FOREVER.

THE UNDISCOUNTED COST OF EXECUTING OPTIM 2 IS 758.970 MILLIONS OF DOLLARS WHEN SUMMED OVER 37 YEARS AND MAY CONTINUE TO ACCRUE AT 0.000 MILLIONS OF DOLLARS PER ANNUM FOREVER.

THE UNDISCOUNTED COST OF EXECUTING OPTIM 1 IS 0.935 MILLIONS OF DOLLARS WHEN SUMMED OVER 37 YEARS AND MAY CONTINUE TO ACCRUE AT 0.0 MILLIONS OF DOLLARS PER ANNUM FOREVER.

THE UNDISCOUNTED DIFFERENCE IN COST OF SELECTING OPTIM 2 OVER OPTIM 1 IS 758.034 MILLIONS OF DOLLARS WHEN SUMMED OVER 37 YEARS.

THE UNDISCOUNTED NET BENEFITS OF SELECTING OPTIM 2 OVER OPTIM 1 IS 3247.827 MILLIONS OF DOLLARS WHEN SUMMED OVER 37 AND 37 YEARS RESPECTFULLY.

THE UNDISCOUNTED BENEFIT/COST RATIO OF SELECTING OPTIM 2 OVER OPTIM 1 IS 5:1 WHEN SUMMED OVER 37 AND 37 YEARS RESPECTFULLY.



MEDITERRANEAN FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

OPTIM 3 TEHUAUANTEPEC BARRIER ZONE MARCH 1976 OPTIMISTIC

OPTIMISTIC

OPTION 3 ASSUMES THAT A BARRIER ZONE WILL BE ERRECTED AT THE ISTHMUS OF TEHUANTEPEC, MEXICO, TO PREVENT OR GREATLY RETARD THE NORTHWARD SPREAD OF THE MEDITERRANEAN FRUIT FLY. THE BARRIER ZONE WOULD MEASURE 60-MILES-DEEP AND 80-MILES-ACROSS. THE MEDITERRANEAN FRUIT FLY POPULATION IN THE BARRIER ZONE WOULD BE MAINTAINED AT NEAR ZERO LEVEL THROUGH THE USE OF TRAPS, ULV MALATHION, TOXIC BAITS, CULTURAL PRACTICES AND QUARANTINE MEASURES. SUCH A BARRIER ZONE, IT WAS ASSUMED, WOULD PREVENT SPREAD FOR EIGHT YEARS, AFTER WHICH THE BARRIER ZONE WOULD BE MOVED SLOWLY AHEAD OF PREAD. INFESTATIONS ABOVE THE BARRIER ZONE WOULD BE ERADICATED THROUGH THE USE OF ULV MALATHION, TOXIC BAITS, AND STERILE MALE RELEASES. THE COST OF CONDUCTING SUCH A PROGRAM INCLUDES THE ERADICATION OF ISOLATED INFESTATIONS ABOVE THE BARRIER ZONE. THE COST OF MAINTAINING A BARRIER ZONE WAS ESTIMATED FROM A 1971 STUDY BY ECONOMIC RESEARCH SERVICE, USDA. IN ADDITION, IT WAS ASSUMED THAT AN AVERAGE OF 4 ISOLATED INFESTATIONS ABOVE THE BARRIER ZONE WOULD OCCUR EACH YEAR. THE COST OF ERADICATING THESE INFESTATIONS ADDED AN AVERAGE OF \$4,876/ACRE TO POTENTIAL COST(PC). THIS OPTION ALSO INCLUDES THE COST OF ERADICATING THE 1975-1976 INFESTATION IN LOS ANGELES COUNTY, CALIFORNIA.

OPTIM 4 TEXAS-MEXICO BARRIER ZONE ALONG THE RIO GRANDE RIVER MARCH 1976

OPTIMISTIC

OPTION 4 ASSUMES THAT NO EFFORT WILL BE MADE TO RETARD SPREAD OF THE MEDITERRANEAN FRUIT FLY BEFORE IT REACHES THE TEXAS-MEXICO BORDER. THE SCENARIO IS SIMILAR TO THAT FOLLOWED FOR CITRUS BLACKFLY--WHERE A BARRIER ZONE WAS MAINTAINED SOUTH OF THE RIO GRANDE RIVER FOR MANY YEARS. THE PER ACRE COST OF MAINTAINING A BARRIER ZONE WAS ASSUMED TO BE CONSTANT EXCEPT FOR GUATEMALA AND MEXICO, WHERE BECAUSE OF LOWER LABOR COSTS PC AS REDUCED 15 PERCENT. PROGRAM COSTS AND LOSSES TO THE MEDITERRANEAN FRUIT FLY ARE EXPEDIENT ESTIMATES TO PERMIT A FIRST APPROXIMATION OF THE BENEFITS AND COSTS OF A PROGRAM TO RETARD THE NORTHWARD SPREAD THROUGH MEXICO AND INTO THE UNITED STATES. THE SAME ASSUMPTIONS WERE MADE IN PREPARING OPTION 4 AS WERE MADE FOR OPTIONS 2 AND 3 -- THE ONLY DIFFERENCES BEING THAT NO EFFORT TO RETARD SPREAD BELOW THE TEXAS-MEXICO BORDER WOULD BE MADE. AN IMPORTANT ASSUMPTION FOR ALL THESE OPTIONS IS THAT EACH STATE, AS WELL AS GUATEMALA AND MEXICO, WOULD CONDUCT A PROGRAM TO PROTECT THEIR COUNTRIES HOST CROPS.



MEDITERRANEAN FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

CROP-AREA		YEARS TILL ARRIVAL OF PEST		YEARS TILL SPREAD OF PEST		POTENTIAL LOSSES MILLIONS OF DOLLARS		YEARS IN AREA		POTENTIAL COST DOLLARS PER ACRE		ACRES OF HOST CROP
		T1	T2	T1	T2	PL	K	PC	PC	PC	PC	
GUATEMALA	OPTIM 3	-2	2	8.121	0	0.0	23500.					
	OPTIM 4	-2	2	8.121	0	0.0	23500.					
SOTHERN MEXICO	OPTIM 3	2	4	23.986	0	0.0	694698.					
	OPTIM 4	2	4	23.986	0	0.0	694698.					
NORTHERN MEXICO	OPTIM 3	5	13	48.044	5	35.229	1389418.					
	OPTIM 4	4	9	48.044	0	0.0	1389418.					
TEXAS	OPTIM 3	13	19	13.574	5	41.443	162900.					
	OPTIM 4	13	19	13.574	5	41.443	162900.					
ARIZONA	OPTIM 3	17	21	21.101	4	41.443	57700.					
	OPTIM 4	17	21	21.101	4	41.443	57700.					
FLORIDA	OPTIM 3	5	14	22.296	6	41.443	937065.					
	OPTIM 4	5	14	22.296	6	41.443	937065.					
GEORGIA	OPTIM 3	11	15	3.285	2	41.443	181100.					
	OPTIM 4	9	13	3.285	2	41.443	181100.					
ALABAMA	OPTIM 3	10	13	0.465	2	41.443	24400.					
	OPTIM 4	8	11	0.465	2	41.443	24400.					
S. CAROLINA	OPTIM 3	12	17	0.612	2	41.443	44300.					
	OPTIM 4	10	15	0.612	2	41.443	44300.					
LOUISIANA	OPTIM 3	8	11	0.208	1	41.443	10500.					
	OPTIM 4	7	10	0.208	1	41.443	10500.					
MISSISSIPPI	OPTIM 3	10	12	0.797	1	41.443	7540.					
	OPTIM 4	9	11	0.797	1	41.443	7540.					
CALIFORNIA	OPTIM 3	11	14	144.000	6	41.443	373000.					
	OPTIM 4	11	14	144.000	6	41.443	373000.					
TOTALS OR AVERAGES		MIN	MAX		MAX							
OPTIM 3		-2	21	286.489	6	31.613	3906121.					
OPTIM 4		-2	21	286.489	6	19.082	3906121.					



MEDITERRANEAN AND FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

YEAR	LOSSES OPTIM 3	LOSSES OPTIM 4	BENEFITS OF OPTIM 4	DISCOUNTED BENEFITS	DISCOUNTED BENEFITS	ACCUMULATED DISCOUNTED BENEFITS
	ALL VALUES IN MILLIONS OF DOLLARS					
1	8.041	8.041	0.000	0.000	0.000	0.000
2	8.123	8.123	0.000	0.000	0.000	0.000
3	20.114	20.114	-0.000	-0.000	-0.000	-0.000
4	32.105	32.110	-0.004	-0.003	-0.003	-0.003
5	32.114	32.300	-0.186	-0.115	-0.115	-0.118
6	32.172	38.696	-6.524	-3.683	-3.683	-3.801
7	32.715	73.712	-40.996	-21.038	-21.038	-24.839
8	37.463	80.959	-43.496	-20.291	-20.291	-45.130
9	62.032	86.260	-24.228	-10.275	-10.275	-55.405
10	92.385	97.636	-5.252	-2.025	-2.025	-57.429
11	101.624	104.587	-2.963	-1.038	-1.038	-58.468
12	110.135	113.507	-3.372	-1.075	-1.075	-59.543
13	243.155	245.328	-2.173	-0.629	-0.629	-60.172
14	251.265	251.824	-0.559	-0.147	-0.147	-60.319
15	252.332	252.416	-0.084	-0.020	-0.020	-60.339
16	258.599	258.601	-0.002	-0.001	-0.001	-60.340
17	264.788	264.788	-0.000	-0.000	-0.000	-60.340
18	265.568	265.568	-0.000	-0.000	-0.000	-60.340
19	275.937	275.937	-0.000	-0.000	-0.000	-60.340
20	286.280	286.280	-0.000	-0.000	-0.000	-60.340
21	286.487	286.487	-0.000	-0.000	-0.000	-60.340
22	286.489	286.489	-0.000	-0.000	-0.000	-60.340
23	286.489	286.489	-0.000	-0.000	-0.000	-60.340
24	286.489	286.489	-0.000	-0.000	-0.000	-60.340
25	286.489	286.489	0.0	0.0	0.0	-60.340
26	286.489	286.489	0.0	0.0	0.0	-60.340
TOTALS	4385.878	4515.717	-129.839	-60.340	-60.340	-60.340







MEDITERRANEAN FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

PRESENT FUNDING, DOLLARS

OPTIM 3 0.  
OPTIM 4 0.

ANTICIPATED CONTINGENCY MONEY, DOLLARS

YEAR	1	2	3
OPTIM 3	931000.	3000.	1000.
OPTIM 4	931000.	3000.	1000.

	4	5	6	7	8
	0.	0.	0.	0.	0.
	0.	0.	0.	0.	0.



MEDITERRANEAN AND FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

	COST		COST		COST		ADDITIONAL		CUMULATIVE	
	OPTIM 3	OPTIM 4	OPTIM 3	OPTIM 4	DIFFERENCE OPTIM 4 - 3	COST DISCOUNTED	COST DISCOUNTED	COST DISCOUNTED		
ALL VALUES IN MILLIONS OF DOLLARS										
1	1.211	1.162			-0.049	-0.044		-0.044		
2	2.210	1.725			-0.485	-0.400		-0.445		
3	14.717	10.267			-4.449	-3.343		-3.788		
4	53.041	28.568			-24.473	-16.716		-20.503		
5	81.604	37.110			-44.494	-27.627		-48.130		
6	87.673	39.259			-48.414	-27.329		-75.459		
7	101.761	53.411			-48.350	-24.811		-100.270		
8	97.079	54.003			-43.076	-20.095		-120.365		
9	68.956	48.942			-20.015	-8.488		-128.854		
10	31.690	33.833			2.143	0.826		-128.027		
11	25.921	25.884			-0.037	-0.013		-128.040		
12	29.157	23.107			-6.050	-1.928		-129.968		
13	12.786	7.703			-5.083	-1.472		-131.440		
14	8.417	6.772			-1.645	-0.433		-131.873		
15	7.900	7.648			-0.252	-0.060		-131.933		
16	5.750	5.743			-0.007	-0.002		-131.935		
17	2.690	2.690			-0.000	-0.000		-131.935		
18	2.382	2.382			-0.000	-0.000		-131.935		
19	1.196	1.196			-0.000	-0.000		-131.935		
20	0.024	0.024			-0.000	-0.000		-131.935		
21	0.000	0.000			-0.000	-0.000		-131.935		
22	0.000	0.000			-0.000	-0.000		-131.935		
23	0.000	0.000			-0.000	-0.000		-131.935		
24	0.000	0.000			-0.000	-0.000		-131.935		
25	0.000	0.000			0.0	0.0		-131.935		
26	0.000	0.000			0.0	0.0		-131.935		
TOTALS	636.165	391.432			-244.734	-131.935		-131.935		



MEDITERRANEAN FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

SUMMARY OF  
OPTIM 4 OVER OPTIM 3

>>>>>>>> PRESENT VALUES <<<<<<<<<<<<

THE PRESENT VALUE OF THE BENEFITS OF SELECTING OPTIM 4 OVER OPTIM 3 DISCOUNTED AT 10.0 PERCENT INTEREST IS  
-60.340 MILLIONS OF DOLLARS AND WILL ACCRUE OVER 26 YEARS.

THE PRESENT VALUE OF THE DIFFERENCE IN COSTS OF SELECTING OPTIM 4 OVER OPTIM 3 WHEN DISCOUNTED AT 10.0  
PERCENT INTEREST IS -131.935 MILLIONS OF DOLLARS AND WILL ACCRUE OVER 26 YEARS.

THE PRESENT VALUE OF THE BENEFIT/COST RATIO OF OPTIM 4 OVER OPTIM 3 IS 0:1 WHEN DISCOUNTED AT 10.0  
PERCENT INTEREST.

THE PRESENT VALUE OF THE NET BENEFITS OF SELECTING OPTIM 4 OVER OPTIM 3 IS 71.595 MILLIONS OF DOLLARS  
WHEN DISCOUNTED AT 10.0 PERCENT INTEREST.

>>>>>>>> UNDISCOUNTED VALUES <<<<<<<<<<<<

THE SUM OF THE UNDISCOUNTED BENEFITS OF SELECTING OPTIM 4 OVER OPTIM 3 IS -129.839 MILLIONS OF DOLLARS  
WHEN ACCRUED OVER 26 YEARS. AND MAY CONTINUE TO ACCRUE AT 0.0 MILLIONS OF DOLLARS PER ANNUM FOREVER.

THE UNDISCOUNTED COST OF EXECUTING OPTIM 4 IS 391.432 MILLIONS OF DOLLARS WHEN SUMMED OVER 26 YEARS  
AND MAY CONTINUE TO ACCRUE AT 0.000 MILLIONS OF DOLLARS PER ANNUM FOREVER.

THE UNDISCOUNTED COST OF EXECUTING OPTIM 3 IS 636.165 MILLIONS OF DOLLARS WHEN SUMMED OVER 26 YEARS  
AND MAY CONTINUE TO ACCRUE AT 0.000 MILLIONS OF DOLLARS PER ANNUM FOREVER.

THE UNDISCOUNTED DIFFERENCE IN COST OF SELECTING OPTIM 4 OVER OPTIM 3 IS -244.734 MILLIONS OF DOLLARS  
WHEN SUMMED OVER 26 YEARS.

THE UNDISCOUNTED NET BENEFITS OF SELECTING OPTIM 4 OVER OPTIM 3 IS 114.895 MILLIONS OF DOLLARS  
WHEN SUMMED OVER 26 AND 26 YEARS RESPECTFULLY.

THE UNDISCOUNTED BENEFIT/COST RATIO OF SELECTING OPTIM 4 OVER OPTIM 3 IS 1:1 WHEN SUMMED OVER 26  
AND 26 YEARS RESPECTFULLY.



MEDITERRANEAN FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

OPTIM 3 TEHUAUATEPEC BARRIER ZONE MARCH 1976 OPTIMISTIC

OPTIMISTIC

OPTION 3 ASSUMES THAT A BARRIER ZONE WILL BE ERCTED AT THE ISTHMUS OF TEHUAUATEPEC, MEXICO, TO PREVENT OR GREATLY RETARD THE NORTHWARD SPREAD OF THE MEDITERRANEAN FRUIT FLY. THE BARRIER ZONE WOULD MEASURE 60-MILES-DEEP AND 80-MILES-ACROSS. THE MEDITERRANEAN FRUIT FLY POPULATION IN THE BARRIER ZONE WOULD BE MAINTAINED AT NEAR ZERO LEVEL THROUGH THE USE OF TRAPS, ULV MALATHION, TOXIC BAITS, CULTURAL PRACTICES AND QUARANTINE MEASURES. SUCH A BARRIER ZONE, IT WAS ASSUMED, WOULD PREVENT SPREAD FOR EIGHT YEARS, AFTER WHICH THE BARRIER ZONE WOULD BE MOVED SLOWLY AHEAD OF SPREAD. INFESTATIONS ABOVE THE BARRIER ZONE WOULD BE ERADICATED THROUGH THE USE OF ULV MALATHION, TOXIC BAITS, AND STERILE MALE RELEASES. THE COST OF CONDUCTING SUCH A PROGRAM INCLUDES THE ERADICATION OF ISOLATED INFESTATIONS ABOVE THE BARRIER ZONE. THE COST OF MAINTAINING A BARRIER ZONE WAS ESTIMATED FROM A 1971 STUDY BY ECONOMIC RESEARCH SERVICE, USDA. IN ADDITION, IT WAS ASSUMED THAT AN AVERAGE OF 4 ISOLATED INFESTATIONS ABOVE THE BARRIER ZONE WOULD OCCUR EACH YEAR. THE COST OF ERADICATING THESE INFESTATIONS ADDED AN AVERAGE OF \$4,876/ACRE TO POTENTIAL COST(PC). THIS OPTION ALSO INCLUDES THE COST OF ERADICATING THE 1975-1976 INFESTATION IN LOS ANGELES COUNTY, CALIFORNIA.

OPTIM 2 GUATEMALA BARRIER ZONE OPTIMISTIC MARCH 1976

OPTIMISTIC

OPTION 2 ASSUMES THAT A BARRIER ZONE WILL BE ERCTED IN GUATEMALA TO PREVENT OR GREATLY RETARD THE NORTHWARD SPREAD OF THE MEDITERRANEAN FRUIT FLY TO BELIZE AND MEXICO. THE BARRIER ZONE WOULD ESSENTIALLY ERADICATE THE MEDITERRANEAN FRUIT FLY FROM A ZONE 60 MILES DEEP, USING AN INTEGRATION OF TOXIC BAITS, ULV MALATHION, TRAPS BAITED WITH LURES, CULTURAL PRACTICES, STERILE MALE RELEASES, AND QUARANTINE MEASURES. BREACHING OF THE GUATEMALA BARRIER WOULD BE FOLLOWED BY A BARRIER ZONE IN THE ISTHMUS OF TEHUAUATEPEC. BREACHING OF THE BARRIER ZONE AT TEHUAUATEPEC WOULD BE FOLLOWED BY A GRADUAL SHIFTING OF A BARRIER ZONE AS THE INFESTATION SLOWLY MOVED NORTHWARD AND FINALLY INFESTED ALL OF ITS ECOLOGICAL RANGE IN NORTH AMERICA. THE COST OF MAINTAINING A BARRIER ZONE WAS ESTIMATED FROM A 1971 STUDY BY ECONOMIC RESEARCH SERVICE. IN ADDITION, IT WAS ASSUMED THAT AN AVERAGE OF 4 ISOLATED INFESTATIONS ABOVE THE BARRIER ZONE WOULD OCCUR EACH YEAR. THE COST OF ERADICATING THESE INFESTATIONS ADDED AN AVERAGE OF \$4,876/ACRE TO POTENTIAL COSTS (PC). THIS OPTION ALSO INCLUDES THE COST OF ERADICATING THE 1975 INFESTATION IN LOS ANGELES COUNTY, CALIFORNIA. THE TOTAL COST OF ERADICATING THIS INFESTATION WAS ESTIMATED AT \$931,000 DURING 1976 WITH AN ADDITIONAL \$3,000 BEING SPENT IN 1977 AND \$1,000 IN 1978 FOR SURVEY AND FOLLOWUP WORK.





MEDITERRANEAN FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

CROP-AREA	YEARS TILL ARRIVAL OF PEST T1	YEARS TILL SPREAD OF PEST T2	POTENTIAL LOSSES MILLIONS OF DOLLARS PL	YEARS IN AREA K	POTENTIAL COST DOLLARS PER ACRE PC	ACRES OF HOST CROP
GUATEMALA						
OPTIM 3	-2	2	8.121	0	0.0	23500.
OPTIM 2	-2	4	8.121	4	35.229	23500.
SOTHERN MEXICO						
OPTIM 3	2	4	23.986	0	0.0	694698.
OPTIM 2	4	10	23.986	5	35.229	694698.
NORTHERN MEXICO						
OPTIM 3	5	13	48.044	5	35.229	1389418.
OPTIM 2	10	18	48.044	5	35.229	1389418.
TEXAS						
OPTIM 3	13	19	13.574	5	41.443	162900.
OPTIM 2	18	22	13.574	5	41.443	162900.
ARIZONA						
OPTIM 3	17	21	21.101	4	41.443	57700.
OPTIM 2	19	23	21.101	4	41.443	57700.
FLORIDA						
OPTIM 3	5	14	22.296	6	41.443	937065.
OPTIM 2	7	17	22.296	6	41.443	937065.
GEORGIA						
OPTIM 3	11	15	3.285	2	41.443	181100.
OPTIM 2	12	16	3.285	2	41.443	181100.
ALABAMA						
OPTIM 3	10	13	0.465	2	41.443	24400.
OPTIM 2	10	13	0.465	2	41.443	24400.
S. CAROLINA						
OPTIM 3	12	17	0.612	2	41.443	44300.
OPTIM 2	13	18	0.612	2	41.443	44300.
LOUISIANA						
OPTIM 3	8	11	0.208	1	41.443	10500.
OPTIM 2	9	12	0.208	1	41.443	10500.
MISSISSIPPI						
OPTIM 3	10	12	0.797	1	41.443	7540.
OPTIM 2	11	13	0.797	1	41.443	7540.
CALIFORNIA						
OPTIM 3	11	14	144.000	6	41.443	373000.
OPTIM 2	26	32	144.000	6	41.443	373000.
TOTALS OR AVERAGES	MIN	MAX		MAX		
OPTIM 3	-2	21	286.489	6	31.613	3906121.
OPTIM 2	-2	32	286.489	6	38.090	3906121.



MEDITERRANEAN AND FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

YEAR	LOSSES OPTIM 3	LOSSES OPTIM 2	BENEFITS OF OPTIM 2	DISCOUNTED BENEFITS	ACCUMULATED DISCOUNTED BENEFITS
1	8.041	4.061	3.980	3.618	3.618
2	8.123	7.761	0.362	0.299	3.917
3	20.114	8.104	12.010	9.024	12.941
4	32.105	8.123	23.983	16.381	29.321
5	32.114	8.173	23.941	14.866	44.187
6	32.172	9.185	22.987	12.976	57.163
7	32.715	20.116	12.599	6.465	63.628
8	37.463	31.057	6.406	2.988	66.617
9	62.032	32.144	29.888	12.676	79.292
10	92.385	32.665	59.720	23.025	102.317
11	101.624	35.424	66.200	23.203	125.520
12	110.135	44.782	65.353	20.824	146.343
13	243.155	57.223	185.932	53.858	200.201
14	251.265	80.994	170.272	44.838	245.040
15	252.332	102.798	149.534	35.798	280.837
16	258.599	107.240	151.358	32.940	313.777
17	264.788	107.761	157.027	31.067	344.844
18	265.568	107.810	157.758	28.374	373.219
19	275.937	107.950	167.987	27.468	400.686
20	286.280	114.810	171.470	25.488	426.175
21	286.487	131.804	154.683	20.903	447.077
22	286.489	142.279	144.210	17.716	464.793
23	286.489	142.487	144.002	16.082	480.875
24	286.489	142.489	144.000	14.620	495.495
25	286.489	142.490	143.999	13.291	508.786
26	286.489	142.503	143.986	12.081	520.867
27	286.489	142.798	143.691	10.961	531.828
28	286.489	148.875	137.614	9.543	541.370
29	286.489	214.489	72.000	4.539	545.909
30	286.489	280.103	6.386	0.366	546.275
31	286.489	286.180	0.309	0.016	546.291
32	286.489	286.475	0.014	0.001	546.292
33	286.489	286.488	0.001	0.000	546.292
34	286.489	286.489	0.000	0.000	546.292
35	286.489	286.489	0.000	0.000	546.292
36	286.489	286.489	0.000	0.000	546.292
37	286.489	286.489	0.000	0.000	546.292
TOTALS	7537.257	4663.596	2873.662	546.292	546.292

ALL VALUES IN MILLIONS OF DOLLARS



MEDITERRANEAN AND FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

PRESENT FUNDING, DOLLARS

OPTIM 3 0.  
OPTIM 2 0.

ANTICIPATED CONTINGENCY MONEY, DOLLARS

YEAR	1	2	3
OPTIM 3	931000.	3000.	1000.
OPTIM 2	931000.	3000.	1000.

	4	5	6	7	8
	0.	0.	0.	0.	0.
	0.	0.	0.	0.	0.



MEDITERRANEAN FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

	COST		COST DIFFERENCE OPTIM 2 - 3	ADDITIONAL COST DISCOUNTED		CUMULATIVE COST DISCOUNTED
	OPTIM 3	OPTIM 2				
ALL VALUES IN MILLIONS OF DOLLARS						
1	1.211	2.434	1.223	1.112	1.112	1.112
2	2.210	12.301	10.091	8.340	9.452	9.452
3	14.717	23.545	8.828	6.633	16.084	16.084
4	53.041	25.370	-27.671	-18.900	-2.815	-2.815
5	81.604	29.736	-51.868	-32.206	-35.021	-35.021
6	87.673	42.854	-44.820	-25.300	-60.321	-60.321
7	101.761	46.240	-55.521	-28.491	-88.812	-88.812
8	97.079	43.394	-53.685	-25.045	-113.857	-113.857
9	68.956	63.117	-5.839	-2.476	-116.333	-116.333
10	31.690	83.719	52.029	20.060	-96.273	-96.273
11	25.921	83.149	57.228	20.058	-76.215	-76.215
12	29.157	71.792	42.634	13.585	-62.630	-62.630
13	12.786	57.414	44.628	12.927	-49.703	-49.703
14	8.417	30.821	22.404	5.900	-43.803	-43.803
15	7.900	9.631	1.731	0.414	-43.389	-43.389
16	5.750	7.469	1.718	0.374	-43.015	-43.015
17	2.690	8.006	5.316	1.052	-41.963	-41.963
18	2.382	9.124	6.742	1.213	-40.751	-40.751
19	1.196	9.076	7.879	1.288	-39.463	-39.463
20	0.024	5.745	5.721	0.850	-38.612	-38.612
21	0.000	1.296	1.295	0.175	-38.437	-38.437
22	0.000	0.710	0.710	0.087	-38.350	-38.350
23	0.000	7.729	7.729	0.863	-37.487	-37.487
24	0.000	14.773	14.773	1.500	-35.987	-35.987
25	0.000	15.425	15.425	1.424	-34.563	-34.563
26	0.000	15.455	15.455	1.297	-33.266	-33.266
27	0.000	15.425	15.425	1.177	-32.090	-32.090
28	0.0	14.773	14.773	1.024	-31.065	-31.065
29	0.0	7.729	7.729	0.487	-30.578	-30.578
30	0.0	0.686	0.686	0.039	-30.539	-30.539
31	0.0	0.033	0.033	0.002	-30.537	-30.537
32	0.0	0.002	0.002	0.000	-30.537	-30.537
33	0.0	0.000	0.000	0.000	-30.537	-30.537
34	0.0	0.000	0.000	0.000	-30.537	-30.537
35	0.0	0.000	0.000	0.000	-30.537	-30.537
36	0.0	0.000	0.000	0.000	-30.537	-30.537
37	0.0	0.000	0.000	0.000	-30.537	-30.537
TOTALS	636.165	758.970	122.804	-30.537	-30.537	-30.537





MEDITERRANEAN FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

>>>>>>> PRESENT VALUES <<<<<<<<<

>>>>>> UNDISCOUNTED VALUES <<<<<<<

THE UNDISCOUNTED BENEFIT/COST RATIO OF SELECTING OPTIM 2 OVER OPTIM 3 IS 23:1 WHEN SUMMED OVER 37 AND 37 YEARS RESPECTFULLY.



MEDITERRANEAN FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

OPTIM 4 TEXAS-MEXICO BARRIER ZONE ALONG THE RIO GRANDE RIVER MARCH 1976

OPTIMISTIC

OPTION 4 ASSUMES THAT NO EFFORT WILL BE MADE TO RETARD SPREAD OF THE MEDITERRANEAN FRUIT FLY BEFORE IT REACHES THE TEXAS-MEXICO BORDER. THE SCENARIO IS SIMILAR TO THAT FOLLOWED FOR CITRUS BLACKFLY--WHERE A BARRIER ZONE WAS MAINTAINED SOUTH OF THE RIO GRANDE RIVER FOR MANY YEARS. THE PER ACRE COST OF MAINTAINING A BARRIER ZONE WAS ASSUMED TO BE CONSTANT EXCEPT FOR GUATEMALA AND MEXICO, WHERE BECAUSE OF LOWER LABOR COSTS PC AS REDUCED 15 PERCENT. PROGRAM COSTS AND LOSSES TO THE MEDITERRANEAN FRUIT FLY ARE EXPEDIENT ESTIMATES TO PERMIT A FIRST APPROXIMATION OF THE BENEFITS AND COSTS OF A PROGRAM TO RETARD THE NORTHWARD SPREAD THROUGH MEXICO AND INTO THE UNITED STATES. THE SAME ASSUMPTIONS WERE MADE IN PREPARING OPTION 4 AS WERE MADE FOR OPTIONS 2 AND 3 -- THE ONLY DIFFERENCES BEING THAT NO EFFORT TO RETARD SPREAD BELOW THE TEXAS-MEXICO BORDER WOULD BE MADE. AN IMPORTANT ASSUMPTION FOR ALL THESE OPTIONS IS THAT EACH STATE, AS WELL AS GUATEMALA AND MEXICO, WOULD CONDUCT A PROGRAM TO PROTECT THEIR COUNTRIES HOST CROPS.

OPTIM 2 GUATEMALA BARRIER ZONE OPTIMISTIC MARCH 1976

OPTIMISTIC

OPTION 2 ASSUMES THAT A BARRIER ZONE WILL BE ERECTED IN GUATEMALA TO PREVENT OR GREATLY RETARD THE NORTHWARD SPREAD OF THE MEDITERRANEAN FRUIT FLY TO BELIZE AND MEXICO. THE BARRIER ZONE WOULD ESSENTIALLY ERADICATE THE MEDITERRANEAN FRUIT FLY FROM A ZONE 60 MILES DEEP, USING AN INTEGRATION OF TOXIC BAITS, ULV MALATHION, TRAPS BAITED WITH LURES, CULTURAL PRACTICES, STERILE MALE RELEASES, AND QUARANTINE MEASURES. BREACHING OF THE GUATEMALA BARRIER WOULD BE FOLLOWED BY A BARRIER ZONE IN THE ISTHMX OF TEHUANTEPEC. BREACHING OF THE BARRIER ZONE AT TEHUANTEPEC WOULD BE FOLLOWED BY A GRADUAL SHIFTING OF A BARRIER ZONE AS THE INFESTATION SLOWLY MOVED NORTHWARD AND FINALLY INFESTED ALL OF ITS ECOLOGICAL RANGE IN NORTH AMERICA. THE COST OF MAINTAINING A BARRIER ZONE WAS ESTIMATED FROM A 1971 STUDY BY ECONOMIC RESEARCH SERVICE. IN ADDITION, IT WAS ASSUMED THAT AN AVERAGE OF 4 ISOLATED INFESTATIONS ABOVE THE BARRIER ZONE WOULD OCCUR EACH YEAR. THE COST OF ERADICATING THESE INFESTATIONS ADDED AN AVERAGE OF \$4.876/ACRE TO POTENTIAL COSTS (PC). THIS OPTION ALSO INCLUDES THE COST OF ERADICATING THE 1975 INFESTATION IN LOS ANGELES COUNTY, CALIFORNIA. THE TOTAL COST OF ERADICATING THIS INFESTATION WAS ESTIMATED AT \$931,000 DURING 1976 WITH AN ADDITIONAL \$3,000 BEING SPENT IN 1977 AND \$1,000 IN 1978 FOR SURVEY AND FOLLOWUP WORK.



MEDITERRANEAN FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

CROP-AREA	YEARS TILL ARRIVAL OF PEST		YEARS TILL SPREAD OF PEST		POTENTIAL LOSSES MILLIONS OF DOLLARS PL	YEARS IN AREA K	POTENTIAL COST DOLLARS PER ACRE PC	ACRES OF HOST CROP
	T1	T2	T1	T2				
GUATEMALA	OPTIM 4	-2	2	8.121	0	0	0.0	23500.
	OPTIM 2	-2	4	8.121	4	4	35.229	23500.
SOTHERN MEXICO	OPTIM 4	2	4	23.986	0	0	0.0	694698.
	OPTIM 2	4	10	23.986	5	5	35.229	694698.
NORTHERN MEXICO	OPTIM 4	4	9	48.044	0	0	0.0	1389418.
	OPTIM 2	10	18	48.044	5	5	35.229	1389418.
TEXAS	OPTIM 4	13	19	13.574	5	5	41.443	162900.
	OPTIM 2	18	22	13.574	5	5	41.443	162900.
ARIZONA	OPTIM 4	17	21	21.101	4	4	41.443	57700.
	OPTIM 2	19	23	21.101	4	4	41.443	57700.
FLORIDA	OPTIM 4	5	14	22.296	6	6	41.443	937065.
	OPTIM 2	7	17	22.296	6	6	41.443	937065.
GEORGIA	OPTIM 4	9	13	3.285	2	2	41.443	181100.
	OPTIM 2	12	16	3.285	2	2	41.443	181100.
ALABAMA	OPTIM 4	8	11	0.465	2	2	41.443	24400.
	OPTIM 2	10	13	0.465	2	2	41.443	24400.
S. CAROLINA	OPTIM 4	10	15	0.612	2	2	41.443	44300.
	OPTIM 2	13	18	0.612	2	2	41.443	44300.
LOUISIANA	OPTIM 4	7	10	0.208	1	1	41.443	10500.
	OPTIM 2	9	12	0.208	1	1	41.443	10500.
MISSISSIPPI	OPTIM 4	9	11	0.797	1	1	41.443	7540.
	OPTIM 2	11	13	0.797	1	1	41.443	7540.
CALIFORNIA	OPTIM 4	11	14	144.000	6	6	41.443	373000.
	OPTIM 2	26	32	144.000	6	6	41.443	373000.
TOTALS OR AVERAGES					MIN	MAX		
OPTIM 4					-2	21	19.082	3906121.
OPTIM 2					-2	32	38.090	3906121.



MEDITERRANEAN AND FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

YEAR	LOSSES OPTIM 4	LOSSES OPTIM 2	BENEFITS OF OPTIM 2	DISCOUNTED BENEFITS	ACCUMULATED DISCOUNTED BENEFITS
ALL VALUES IN MILLIONS OF DOLLARS					
1	8.041	4.061	3.980	3.618	3.618
2	8.123	7.761	0.362	0.299	3.917
3	20.114	8.104	12.010	9.024	12.941
4	32.110	8.123	23.987	16.384	29.324
5	32.300	8.173	24.127	14.981	44.306
6	38.696	9.185	29.511	16.658	60.964
7	73.712	20.116	53.595	27.503	88.467
8	80.959	31.057	49.901	23.279	111.746
9	86.260	32.144	54.116	22.951	134.697
10	97.636	32.665	64.971	25.049	159.746
11	104.587	35.424	69.163	24.241	183.988
12	113.507	44.782	68.725	21.898	205.886
13	245.328	57.223	188.105	54.488	260.373
14	251.824	80.994	170.830	44.985	305.359
15	252.416	102.798	149.618	35.818	341.176
16	258.601	107.240	151.361	32.941	374.117
17	264.788	107.761	157.027	31.067	405.184
18	265.568	107.810	157.758	28.374	433.559
19	275.937	107.950	167.987	27.468	461.026
20	286.280	114.810	171.470	25.488	486.514
21	286.487	131.804	154.683	20.903	507.417
22	286.489	142.279	144.210	17.716	525.133
23	286.489	142.487	144.002	16.082	541.215
24	286.489	142.489	144.000	14.620	555.835
25	286.489	142.490	143.999	13.291	569.125
26	286.489	142.503	143.986	12.081	581.207
27	286.489	142.798	143.691	10.961	592.167
28	286.489	148.875	137.614	9.543	601.710
29	286.489	214.489	72.000	4.539	606.249
30	286.489	280.103	6.386	0.366	606.615
31	286.489	286.180	0.309	0.016	606.631
32	286.489	286.475	0.014	0.001	606.632
33	286.489	286.488	0.001	0.000	606.632
34	286.489	286.489	0.000	0.000	606.632
35	286.489	286.489	0.000	0.000	606.632
36	286.489	286.489	0.000	0.000	606.632
37	286.489	286.489	0.000	0.000	606.632
TOTALS	7667.096	4663.596	3003.501	606.632	606.632







MEDITERRANEAN AND FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

PRESENT FUNDING, DOLLARS

OPTIM 4 0.  
OPTIM 2 0.

ANTICIPATED CONTINGENCY MONEY, DOLLARS

YEAR 1 2 3  
OPTIM 4 931000. 3000. 1000.  
OPTIM 2 931000. 3000. 1000.

4 5 6 7 8  
0. 0. 0. 0. 0.  
0. 0. 0. 0. 0.



MEDITERRANEAN FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

	COST		COST		COST		COST		CUMULATIVE	
	OPTIM 4	OPTIM 2	OPTIM 2	DIFFERENCE	DISCOUNTED	DISCOUNTED	DISCOUNTED	DISCOUNTED	DISCOUNTED	DISCOUNTED
1	1.162	2.434	1.272	1.156	1.156	1.156	1.156	1.156	1.156	1.156
2	1.725	12.301	10.576	8.740	8.740	8.740	8.740	8.740	8.740	9.896
3	10.267	23.545	13.277	9.976	9.976	9.976	9.976	9.976	9.976	19.872
4	28.568	25.370	-2.197	-2.184	-2.184	-2.184	-2.184	-2.184	-2.184	17.688
5	37.110	29.736	-7.374	-4.579	-4.579	-4.579	-4.579	-4.579	-4.579	13.109
6	39.259	42.854	3.595	2.029	2.029	2.029	2.029	2.029	2.029	15.138
7	53.411	46.240	-7.171	-3.680	-3.680	-3.680	-3.680	-3.680	-3.680	11.458
8	54.003	43.394	-10.609	-4.949	-4.949	-4.949	-4.949	-4.949	-4.949	6.509
9	48.942	63.117	14.175	6.012	6.012	6.012	6.012	6.012	6.012	12.521
10	33.833	83.719	49.886	19.233	19.233	19.233	19.233	19.233	19.233	31.754
11	25.884	83.149	57.265	20.071	20.071	20.071	20.071	20.071	20.071	51.825
12	23.107	71.792	48.684	15.512	15.512	15.512	15.512	15.512	15.512	67.337
13	7.703	57.414	49.711	14.400	14.400	14.400	14.400	14.400	14.400	81.737
14	6.772	30.821	24.049	6.333	6.333	6.333	6.333	6.333	6.333	88.070
15	7.648	9.631	1.983	0.475	0.475	0.475	0.475	0.475	0.475	88.544
16	5.743	7.469	1.725	0.376	0.376	0.376	0.376	0.376	0.376	88.920
17	2.690	8.006	5.316	1.052	1.052	1.052	1.052	1.052	1.052	89.972
18	2.382	9.124	6.742	1.213	1.213	1.213	1.213	1.213	1.213	91.184
19	1.196	9.076	7.879	1.288	1.288	1.288	1.288	1.288	1.288	92.473
20	0.024	5.745	5.721	0.850	0.850	0.850	0.850	0.850	0.850	93.323
21	0.000	1.296	1.295	0.175	0.175	0.175	0.175	0.175	0.175	93.498
22	0.000	0.710	0.710	0.087	0.087	0.087	0.087	0.087	0.087	93.585
23	0.000	7.729	7.729	0.863	0.863	0.863	0.863	0.863	0.863	94.448
24	0.000	14.773	14.773	1.500	1.500	1.500	1.500	1.500	1.500	95.948
25	0.000	15.425	15.425	1.424	1.424	1.424	1.424	1.424	1.424	97.372
26	0.000	15.455	15.455	1.297	1.297	1.297	1.297	1.297	1.297	98.669
27	0.000	15.425	15.425	1.177	1.177	1.177	1.177	1.177	1.177	99.845
28	0.0	14.773	14.773	1.024	1.024	1.024	1.024	1.024	1.024	100.870
29	0.0	7.729	7.729	0.487	0.487	0.487	0.487	0.487	0.487	101.357
30	0.0	0.686	0.686	0.039	0.039	0.039	0.039	0.039	0.039	101.396
31	0.0	0.033	0.033	0.002	0.002	0.002	0.002	0.002	0.002	101.398
32	0.0	0.002	0.002	0.000	0.000	0.000	0.000	0.000	0.000	101.398
33	0.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	101.398
34	0.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	101.398
35	0.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	101.398
36	0.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	101.398
37	0.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	101.398
TOTALS	391.432	758.970	367.538	101.398	101.398	101.398	101.398	101.398	101.398	101.398

ALL VALUES IN MILLIONS OF DOLLARS



MEDITERRANEAN FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

SUMMARY OF  
OPTIM 2 OVER OPTIM 4

>>>>>>>> PRESENT VALUES <<<<<<<<<<<<

THE PRESENT VALUE OF THE BENEFITS OF SELECTING OPTIM 2 OVER OPTIM 4 DISCOUNTED AT 10.0 PERCENT INTEREST IS 606.632 MILLIONS OF DOLLARS AND WILL ACCRUE OVER 37 YEARS.

THE PRESENT VALUE OF THE DIFFERENCE IN COSTS OF SELECTING OPTIM 2 OVER OPTIM 4 WHEN DISCOUNTED AT 10.0 PERCENT INTEREST IS 101.398 MILLIONS OF DOLLARS AND WILL ACCRUE OVER 37 YEARS.

THE PRESENT VALUE OF THE BENEFIT/COST RATIO OF OPTIM 2 OVER OPTIM 4 IS 6:1 WHEN DISCOUNTED AT 10.0 PERCENT INTEREST.

THE PRESENT VALUE OF THE NET BENEFITS OF SELECTING OPTIM 2 OVER OPTIM 4 IS 505.234 MILLIONS OF DOLLARS WHEN DISCOUNTED AT 10.0 PERCENT INTEREST.

>>>>>>>> UNDISCOUNTED VALUES <<<<<<<<<<<<

THE SUM OF THE UNDISCOUNTED BENEFITS OF SELECTING OPTIM 2 OVER OPTIM 4 IS 3003.501 MILLIONS OF DOLLARS WHEN ACCRUED OVER 37 YEARS, AND MAY CONTINUE TO ACCRUE AT 0.000 MILLIONS OF DOLLARS PER ANNUM FOREVER.

THE UNDISCOUNTED COST OF EXECUTING OPTIM 2 IS 758.970 MILLIONS OF DOLLARS WHEN SUMMED OVER 37 YEARS AND MAY CONTINUE TO ACCRUE AT 0.000 MILLIONS OF DOLLARS PER ANNUM FOREVER.

THE UNDISCOUNTED COST OF EXECUTING OPTIM 4 IS 391.432 MILLIONS OF DOLLARS WHEN SUMMED OVER 37 YEARS AND MAY CONTINUE TO ACCRUE AT 0.0 MILLIONS OF DOLLARS PER ANNUM FOREVER.

THE UNDISCOUNTED DIFFERENCE IN COST OF SELECTING OPTIM 2 OVER OPTIM 4 IS 367.538 MILLIONS OF DOLLARS WHEN SUMMED OVER 37 YEARS.

THE UNDISCOUNTED NET BENEFITS OF SELECTING OPTIM 2 OVER OPTIM 4 IS 2635.963 MILLIONS OF DOLLARS WHEN SUMMED OVER 37 AND 37 YEARS RESPECTFULLY.

THE UNDISCOUNTED BENEFIT/COST RATIO OF SELECTING OPTIM 2 OVER OPTIM 4 IS 8:1 WHEN SUMMED OVER 37 AND 37 YEARS RESPECTFULLY.



>>>>>>> SUMMARY OF BENEFIT/COST ANALYSIS <<<<<<<<

OPTIM 1 DO NOTHING - ERADICATION OF 1975 CALIF. INFESTATION SUCCESSFUL.

OPTION 1 ASSUMES THAT NEITHER GOVERNMENTS OF GUATEMALA, MEXICO, NOR THE UNITED STATES WILL CONDUCT A PROGRAM TO RETARD THE SPREAD OF THE MEDITERRANEAN FRUIT FLY FROM CENTRAL AMERICA TO THE SUSCEPTIBLE AREAS IN NORTH AMERICA AND MEXICO. A FURTHER ASSUMPTION IS THAT THE PRODUCERS OF THE HOST CROPS WILL EMPLOY EXISTING PEST CONTROL TECHNOLOGY SIMILAR TO THAT IN USE IN THE MEDITERRANEAN COUNTRIES, I. COMBAT THIS PEST. UNREALIZED YIELDS WILL, THEREFORE, BE HELD TO A LEVEL COMMENSURATE WITH THE PRODUCER'S PERCEIVED BENEFITS FROM SUCH CONTROL MEASURES. THE POTENTIAL LOSSES GIVEN BELOW INCLUDE THE VALUE OF UNREALIZED YIELDS PLUS THE COST OF CONTROL INCURRED BY THE FARMER IN PROTECTING HIS CROPS. THE VALUES USED AS INPUTS TO THIS BENEFIT/COST ANALYSIS ARE CRUDE ESTIMATES AND REPRESENT EXPEDIENT ESTIMATES TO PERMIT MAKING A FIRST APPROXIMATION OF THE BENEFITS AND COSTS OF CONDUCTING A MEDITERRANEAN FRUIT FLY PROGRAM IN EITHER MEXICO OR GUATEMALA. THE 'DO NOTHING' OPTION IS INCLUDED TO FORM A BASIS FOR ESTIMATING THE BENEFITS AND COSTS OF THE OTHER OPTIONS. IT WAS ASSUMED THAT EACH ACRE OF HOST CROP WOULD RECEIVE 4 INSECTICIDE APPLICATIONS AT \$3.50/ACRE/ APPLICATION EXCEPT FOR MEXICO AND GUATEMALA WHERE ONLY 2 APPLICATIONS WERE ASSUMED. Owing TO THE LOWER TECHNOLOGICAL AGRICULTURE BASE. IT WAS FURTHER ASSUMED THAT THE INFESTATION IN CALIFORNIA WOULD BE ERADICATED AT A COST OF \$9350000 OVER THE NEXT THREE YEARS.

OPTIM 3 TEHAUANTEPEC BARRIER ZONE MARCH 1976 OPTIMISTIC

OPTION 3 ASSUMES THAT A BARRIER ZONE WILL BE ERCTED AT THE ISTHMUS OF TEHUANTEPEC, MEXICO, TO PREVENT OR GREATLY RETARD THE NORTHWARD SPREAD OF THE MEDITERRANEAN FRUIT FLY. THE BARRIER ZONE WOULD MEASURE 60-MILES-DEEP AND 80-MILES-ACROSS. THE MEDITERRANEAN FRUIT FLY POPULATION IN THE BARRIER ZONE WOULD BE MAINTAINED AT NEAR ZERO LEVEL THROUGH THE USE OF TRAPS, ULV MALATHION, TOXIC BAITS, CULTURAL PRACTICES AND QUARANTINE MEASURES. SUCH A BARRIER ZONE, IT WAS ASSUMED, WOULD PREVENT SPREAD FOR EIGHT YEARS, AFTER WHICH THE BARRIER ZONE WOULD BE MOVED SLOWLY AHEAD OF SPREAD. INFESTATIONS ABOVE THE BARRIER ZONE WOULD BE ERADICATED THROUGH THE USE OF ULV MALATHION, TOXIC BAITS, AND STERILE MALE RELEASES. THE COST OF CONDUCTING SUCH A PROGRAM INCLUDES THE ERADICATION OF ISOLATED INFESTATIONS ABOVE THE BARRIER ZONE. THE COST OF MAINTAINING A BARRIER ZONE WAS ESTIMATED FROM A 1971 STUDY BY ECONOMIC RESEARCH SERVICE, USDA. IN ADDITION, IT WAS ASSUMED THAT AN AVERAGE OF 4 ISOLATED INFESTATIONS ABOVE THE BARRIER ZONE WOULD OCCUR EACH YEAR. THE COST OF ERADICATING THESE INFESTATIONS ADDED AN AVERAGE OF \$4.876/ACRE TO POTENTIAL COST(PC). THIS OPTION ALSO INCLUDES THE COST OF ERADICATING THE 1975-1976 INFESTATION IN LOS ANGELES COUNTY, CALIFORNIA.

OPTIM

4 TEXAS-MEXICO BARRIER ZONE ALONG THE RIO GRANDE RIVER MARCH 1976

OPTION 4 ASSUMES THAT NO EFFORT WILL BE MADE TO RETARD SPREAD OF THE MEDITERRANEAN FRUIT FLY BEFORE IT REACHES THE TEXAS-MEXICO BORDER. THE SCENARIO







IS SIMILAR TO THAT FOLLOWED FOR CITRUS BLACKFLY--WHERE A BARRIER ZONE WAS MAINTAINED SOUTH OF THE RIO GRANDE RIVER FOR MANY YEARS. THE PER ACRE COST OF MAINTAINING A BARRIER ZONE WAS ASSUMED TO BE CONSTANT EXCEPT FOR GUATEMALA AND MEXICO, WHERE BECAUSE OF LOWER LABOR COSTS PC AS REDUCED 15 PERCENT. PROGRAM COSTS AND LOSSES TO THE MEDITERRANEAN FRUIT FLY ARE EXPEDIENT ESTIMATES TO PERMIT A FIRST APPROXIMATION OF THE BENEFITS AND COSTS OF A PROGRAM TO RETARD THE NORTHWARD SPREAD THROUGH MEXICO AND INTO THE UNITED STATES. THE SAME ASSUMPTIONS WERE MADE IN PREPARING OPTION 4 AS WERE MADE FOR OPTIONS 2 AND 3 -- THE ONLY DIFFERENCES BEING THAT NO EFFORT TO RETARD SPREAD BELOW THE TEXAS-MEXICO BORDER WOULD BE MADE. AN IMPORTANT ASSUMPTION FOR ALL THESE OPTIONS IS THAT EACH STATE, AS WELL AS GUATEMALA AND MEXICO, WOULD CONDUCT A PROGRAM TO PROTECT THEIR COUNTRIES HOST CROPS.

OPTIM 2 GUATEMALA BARRIER ZONE OPTIMISTIC MARCH 1976

OPTIMISTIC

OPTION 2 ASSUMES THAT A BARRIER ZONE WILL BE ERECTED IN GUATEMALA TO PREVENT OR GREATLY RETARD THE NORTHWARD SPREAD OF THE MEDITERRANEAN FRUIT FLY TO BELIZE AND MEXICO. THE BARRIER ZONE WOULD ESSENTIALLY ERADICATE THE MEDITERRANEAN FRUIT FLY FROM A ZONE 60 MILES DEEP, USING AN INTEGRATION OF TOXIC BAITS, ULV MALATHION, TRAPS BAITED WITH LURES, CULTURAL PRACTICES, STERILE MALE RELEASES, AND QUARANTINE MEASURES. BREACHING OF THE GUATEMALA BARRIER WOULD BE FOLLOWED BY A BARRIER ZONE IN THE ISTHMX OF TEHUANTEPEC. BREACHING OF THE BARRIER ZONE AT TEHUANTEPEC WOULD BE FOLLOWED BY A GRADUAL SHIFTING OF A BARRIER ZONE AS THE INFESTATION SLOWLY MOVED NORTHWARD AND FINALLY INFESTED ALL OF ITS ECOLOGICAL RANGE IN NORTH AMERICA. THE COST OF MAINTAINING A BARRIER ZONE WAS ESTIMATED FROM A 1971 STUDY BY ECONOMIC RESEARCH SERVICE. IN ADDITION, IT WAS ASSUMED THAT AN AVERAGE OF 4 ISOLATED INFESTATIONS ABOVE THE BARRIER ZONE WOULD OCCUR EACH YEAR. THE COST OF ERADICATING THESE INFESTATIONS ADDED AN AVERAGE OF \$4.876/ACRE TO POTENTIAL COSTS (PC). THIS OPTION ALSO INCLUDES THE COST OF ERADICATING THE 1975 INFESTATION IN LOS ANGELES COUNTY, CALIFORNIA. THE TOTAL COST OF ERADICATING THIS INFESTATION WAS ESTIMATED AT \$931,000 DURING 1976 WITH AN ADDITIONAL \$3,000 BEING SPENT IN 1977 AND \$1,000 IN 1978 FOR SURVEY AND FOLLOWUP WORK.







OPTIM	2	13	18	0.612	2	41.443	44300.
LOUISIANA							
OPTIM	1	7	9	0.208	0	0.0	10500.
OPTIM	3	8	11	0.208	1	41.443	10500.
OPTIM	4	7	10	0.208	1	41.443	10500.
OPTIM	2	9	12	0.208	1	41.443	10500.
MISSISSIPPI							
OPTIM	1	8	10	0.797	0	0.0	7540.
OPTIM	3	10	12	0.797	1	41.443	7540.
OPTIM	4	9	11	0.797	1	41.443	7540.
OPTIM	2	11	13	0.797	1	41.443	7540.
CALIFORNIA							
OPTIM	1	7	9	144.000	0	0.0	373000.
OPTIM	3	11	14	144.000	6	41.443	373000.
OPTIM	4	11	14	144.000	6	41.443	373000.
OPTIM	2	20	32	144.000	6	41.443	373000.
TOTALS OR AVERAGES							
		MIN	MAX		MAX		
OPTIM	1	-2	12	286.489	0	0.0	3906121.
OPTIM	3	-2	21	286.489	6	31.613	3906121.
OPTIM	4	-2	21	286.489	6	19.082	3906121.
OPTIM	2	-2	32	286.489	6	38.090	3906121.



MEDITERRANEAN FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

[illegible]

PRESENT FUNDING, DOLLARS

OPTIM	1	3	4	2
C.	0.	0.	0.	0.

ANTICIPATED CONTINGENCY MONEY, DOLLARS

YEAR	1	2	3	4	5	6	7	8
OPTIM 1	931000.	3000.	1000.	0.	0.	0.	0.	0.
OPTIM 3	931000.	3000.	1000.	0.	0.	0.	0.	0.
OPTIM 4	931000.	3000.	1000.	0.	0.	0.	0.	0.
OPTIM 2	931000.	3000.	1000.	0.	0.	0.	0.	0.





MEDITERRANEAN FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976

SUMMARY OF BENEFIT/COST ANALYSIS &lt;&lt;&lt;&lt;&lt;&lt;&lt;

-----GRAND SUMMARY TABLE-----

ALL VALUES IN MILLIONS OF DOLLARS												
UNDISCOUNTED VALUES							PRESENT VALUES					
OPTION	COST OF EXECUTING OPTION	DIFFER- ENCE IN COST	ACCRUAL PERIOD IN YEARS	ACCRUAL RATE AT END OF ACCRUAL PERIOD	SUM OF LOSSES	SUM OF BENEFITS	ACCRUAL PERIOD IN YEARS	ACCRUAL RATE OF END OF ACCRUAL PERIOD	UNDIS- COUNTED B/C RATIO	DIFFER- ENCE IN COST	DIFFER- ENCE IN LOSSES =BENEFITS	B/C RATIO
OPTIM 3 OVER	636.165	635.230	26	0.000	4385.878	1132.200	26	0.000	2:1	317.090	416.927	1:1
OPTIM 1	0.935		26	0.0	5518.078		26					
OPTIM 4 OVER	391.432	390.497	26	0.000	4515.717	1002.361	26	0.000	3:1	185.155	356.587	2:1
OPTIM 1	0.935		26	0.0	5518.078		26					
OPTIM 2 OVER	758.970	758.034	37	0.000	4663.596	4005.861	37	0.000	5:1	286.553	963.219	3:1
OPTIM 1	0.935		37	0.0	8669.457		37					
OPTIM 4 OVER	391.432	-244.734	26	0.000	4515.717	-129.839	26	0.0	1:1	-131.935	-60.340	0:1
OPTIM 3	636.165		26	0.000	4385.878		26					
OPTIM 2 OVER	758.970	122.804	37	0.000	4663.596	2873.662	37	0.000	23:1	-30.537	546.292	-18:1
OPTIM 3	636.165		37	0.0	7537.257		37					
OPTIM 2 OVER	758.970	367.538	37	0.000	4663.596	3003.501	37	0.000	8:1	101.398	606.632	6:1
OPTIM 4	391.432		37	0.0	7667.096		37					

\* \* \* \* \*  
END OF BENEFIT/COST ANALYSIS FOR

MEDITERRANEAN FRUIT FLY -- PRELIMINARY BENEFIT/COST ANALYSIS - MARCH 1976









